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PROJECT PROPOSAL FOR THE MAJOR FACILITIES REQUIRED FOR A PROVINCIAL HAZARDOUS WASTE MANAGEMENT SYSTEM

MANITOBA HAZARDOUS WASTE MANAGEMENT CORPORATION

91-03922/

Environmental Policy Statement

The Manitoba Hazardous Waste Management Corporation is committed to the preservation and enhancement of environmental quality through the development of a hazardous waste management system for the Province. This undertaking is a fundamental element needed to achieve the broader objectives of universal environmental stewardship and sustainable economic development within Manitoba.

To reach these goals, the Corporation uses the following policy objectives as the basis for the performance of its work.

- Minimize waste generation and maximize resource conservation through the promotion and facilitation of waste reduction, recycling, re-use and recovery at source.
- Ensure that all activities involved with the handling, storage, treatment and disposal of waste and residue products are consistent with the protection of public health and environmental quality.
- Earn public approval of the system and its components through open and responsive communication and through public participation in all aspects of their development and operation.
- Encourage economic development through the provision of a cost-effective waste management system and the enhancement of environmentally based enterprises.
- Foster and promote contemporary environmental values and policies through public education and research, as well as by example.
- Assume, in perpetuity, the environmental stewardship of wastes and residues placed in the Corporation's custody.

Corporate Profile

The Manitoba Hazardous Waste Management Corporation is a commercial Crown corporation established to develop and operate a hazardous waste management system for Manitoba. Its mandate is to provide for the handling of regulated hazardous wastes from their source through to their treatment and disposal, consistent with high standards of public health, safety and environmental quality.

Manitoba Hazardous Waste Management Corporation

Further information regarding the activities and programs of the Manitoba Hazardous Waste Management Corporation can be obtained from:
226-530 Century Street
Winnipeg, Manitoba
R3H 0Y4
Telephone: (204) 945-1844
Toll Free: 1-800-782-2474

**Manitoba
Hazardous Waste
Management Corporation**

226 — 530 Century Street, Winnipeg, Manitoba R3H 0Y4 Telephone: (204) 945-1844

April 12, 1990

Environmental Management Services Division
Department of Environment
Building 2, Fort Osborne Complex
139 Tuxedo Avenue
Winnipeg, Manitoba
R3N 0H6

Attention: Mr. Norman Brandson, P.Eng.
Director

Dear Mr. Brandson:

Re: **Project Proposal For the Major Facilities Required For a Provincial Hazardous Waste Management System**

The Manitoba Hazardous Waste Management Corporation is undertaking the development of a comprehensive hazardous waste management system for the province and the major off-site facilities required for it. To date, the work toward this end includes defining the major components of the system, characterization of the waste market, major facilities design and identification of overall siting options. This has been documented in the attached project proposal submission made under the Dangerous Goods Handling and Transportation Act and, as deemed appropriate, the Manitoba Environment Act. It is being submitted for the consideration of the Department as the first stage of the regulatory review process, applicable to the various system components.

Consistent with the recommendations flowing from the first phase of the province's overall program in this area, the Corporation is proposing that the functional management of hazardous waste be undertaken through an integrated system extending from the source through to treatment and disposal. The first priority in such a system should be maximizing source based management, through reduction, reuse, recovery, recycling and on-site treatment. However, off-site developments will also be required for the collection, accumulation, treatment and disposal of materials not suitable for management at source. The principle off-site facilities required by the proposed system and covered in this submission are;

- A storage and transfer facility, located in or near Winnipeg and providing accumulation, storage and bulking capability, mainly for organic wastes to be exported to treatment facilities in other jurisdictions, longer term storage of materials for which treatment capability is unavailable and potentially offering volume reduction and/or recycling capability, and

- A central treatment facility, located either on a stand alone basis away from Winnipeg or in combination with the storage/transfer facility, and providing physical/chemical treatment for inorganic and aqueous organic material, and secure disposal of treatment residues.

The submission consists of a project proposal document and three Appendices containing supporting material and studies referenced in the project proposal. The proposal document provides the following:

- Background material on the Province's hazardous waste management program and the proponent,

- A summary of the Corporation's overall system development work including the approach to it, waste market characterization information and the proposed development plan,

- Detailed technical descriptions of the major off-site facilities proposed for the system, namely a central treatment facility, storage/transfer facility and the combination of the two,

- The siting process being applied for these facilities and its status, and

- Assessment studies undertaken to date and a proposed scope of work applicable to the environmental impact assessment (EIA) required for the major facilities.

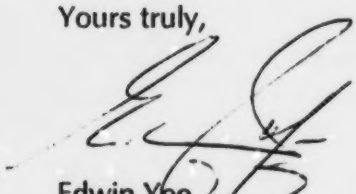
The purpose of this submission from the Corporation's perspective is twofold. Firstly, its submission at this time allows regulatory and formal public review of the overall concept of a hazardous waste management system and early input into the planning of the major facilities required for it. This should provide the Corporation with useful direction as it proceeds with the facility development work on a site specific basis. Furthermore, it may assist in regulatory and public consideration of other initiatives by allowing their review in the context of the overall system proposed by the Corporation. Secondly, the submission is specifically requesting the issuance of environmental assessment guidelines for the major facilities, something that the approach of proactively proposing an EIA scope is intended to facilitate. In this regard, the Corporation views public input into both the proposed scope and any guidelines issued by the Department as assisting in maintaining the credibility of the environmental assessment process.

Based on the response received from this submission, the Corporation will proceed with the completion of facility siting, design and environmental impact assessment. This will form the basis of a final site specific application or applications for the major facilities. At each stage, the Corporation understands that this proposal and subsequent site specific applications will be subject to the provisions of the Manitoba Environment Act and may, at the election of the Minister of Environment, be subject to public hearings before the Clean Environment Commission.

Consistent with the Corporation's policy respecting public access to the results of its work, this submission is being made available to a number of groups, organizations and communities who have expressed interest in the development. While their comments and input are being solicited directly, we are asking that they also make their views known directly to the department. Furthermore, we would anticipate that the Department will place the submission in its public registry and be requesting general public comment on it. To this end we are submitting 25 copies of the submission and 4 copies of the supporting material. All documents will also be available to the public in the Corporation's resource centre at the above address during normal working hours and copies of the proposal are being forwarded to all regional public libraries. Additional copies can also be made available upon request.

In conclusion, we look forward to receiving your response to this submission and are available to discuss its contents at your convenience.

Yours truly,



Edwin Yee
Manager, System Development

PROJECT PROPOSAL

FOR

THE MAJOR FACILITIES

REQUIRED FOR

A PROVINCIAL HAZARDOUS WASTE MANAGEMENT SYSTEM

MANITOBA HAZARDOUS WASTE MANAGEMENT CORPORATION

April/1990

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PROJECT PROPOSAL

MAJOR FACILITIES REQUIRED FOR A PROVINCIAL HAZARDOUS WASTE MANAGEMENT SYSTEM

EXECUTIVE SUMMARY

Since its establishment in 1987, the Manitoba Hazardous Waste Management Corporation has undertaken the planning and development of a comprehensive hazardous waste management system in the province. This work has progressed to the point that the elements of this system have been identified, the waste market has been characterized, the major facilities required have been defined and the overall options for siting them have been developed. The purpose of this proposal is twofold; firstly to formally initiate regulatory and public consideration of this work, and secondly, the proposal is requesting regulatory guidance respecting the environmental impact assessment work required to complete development of the major facilities involved.

The proposal is made pursuant to the Dangerous Goods Handling and Transportation Act and subject to the Manitoba Environment Act for purposes of public review and environmental impact assessment. Its submission initiates the first stage of what is envisioned as a two stage regulatory review process. Based on the regulatory guidance and public input received as a result of this submission, the siting, design and environmental assessment work related to the major facilities involved in the system will be completed and a final application(s) will be submitted for consideration as the second stage of the process.

The Corporation is proposing the development of an overall system for the management of regulated hazardous waste, integrated from source through to its treatment and disposal. This is consistent with the direction advocated by the Clean Environment Commission as a result of the first phase of the province's overall hazardous waste management program (1982 - 1987). The principal elements of this operating system are:

a) Source based management capability;

b) Collection and storage infrastructure; and,

c) Treatment and disposal facilities.

The functional operating capability developed will have to be supported by strong regulatory enforcement policies at both the provincial and municipal levels. This is considered to be a prerequisite to the functional and economic viability of the proposed developments. Furthermore, the overall system and its individual components will require a high level of public support and acceptance for its implementation. To achieve this, the system should provide for public involvement in its development and operation, and will have to incorporate an assurance capability respecting its integrity, operating standards and liability protection.

The system being proposed is intended to manage the complete range of materials subject to provincial regulation under the Handling and Transportation of Dangerous Goods Act. Materials under exclusive federal regulation, notably radioactive and explosive materials are excluded from this scope. It will also make provision for the management of industrial waste streams that, while not regulated as hazardous wastes, are restricted by municipal regulators from access to conventional waste management facilities.

The estimated volume of hazardous waste requiring management by the overall provincial system is at least 178,700 tonnes/year. The large majority of this material can be most effectively managed at source, through application of reduction, reuse, recycling, recovery, and on-site treatment. However, an estimated 22,679 tonnes/year of material is currently estimated to require some form of off-site management. This quantity is made up of 9,422 tonnes of organic material and 13,257 tonnes of inorganic material. In excess of 80% of that identified originates in the Winnipeg region.

Based on this characterization of the waste market, the proposed system should maintain the management of waste at source as its priority. This will be accomplished by increased regulatory enforcement, provision of technical assistance to waste generators, public education and awareness programs and the investment in specialized treatment capability for application at the source.

The proposed off-site capability consists of three facility components:

a) A regional collection capability involving relatively small depots developed in association with municipal waste management facilities and served by a dedicated transportation system;

b) A storage/transfer facility, located in or near Winnipeg and providing accumulation, storage, and bulking capability, mainly for organic waste to be exported to treatment facilities in other jurisdictions, the longer term storage of materials for which no treatment capability is currently accessible, and potentially providing volume reduction and/or recycling capability; and,

c) A central treatment facility, located either away from Winnipeg in Southern Manitoba or in combination with the storage/transfer facility and providing physical/chemical treatment for inorganic and aqueous organic wastes along with secure disposal of treatment residues.

The proposed system facilities do not include the development of incineration capabilities for organic wastes on the grounds that the volumes of material requiring this treatment technology are insufficient to justify the investment in this capability, particularly when current and expected capacity elsewhere is available. However, it does not preclude the development of competent capability to manage organic materials within the province through recycling or other resource recovery options such as co-disposal as industrial fuel. Similarly, the incremental additions of specialized incineration capacity for the treatment of bio-medical materials may also be required, likely within the health care system.

This proposal provides detailed descriptions of the central treatment and storage/transfer facilities. These represent the major investments required, have the most significant potential environmental implications and are viewed as the most sensitive in terms of siting acceptance by the public. As noted above, these major facilities can be developed either separately or be combined in or near Winnipeg. The Corporation is currently pursuing both configurations and they are described in detail in this proposal. The final selection of configuration and its presentation for regulatory approval will occur after completion of evaluation work on specific siting alternatives available and the appropriate environmental impact assessment.

The approach adopted by the Corporation for locating these facilities is based on identifying sites satisfying two overall considerations:

- Provision of a high degree of natural environmental protection; and,
- Being generally acceptable to the local community.

The first is being addressed through the application of rigorous technical and environmental criteria, at both a provincial level to identify areas of greatest interest and subsequently at a community level, in partnership with the community itself. The second involves only pursing the development on the invitation of interested communities and with their direct involvement in the development process. At both the provincial and local levels, the Corporation places a high emphasis on the provision of information respecting the issue and receiving public input on what is being proposed. This emphasis is based on the belief that the development of an effective hazardous waste management capability can only occur with a broad recognition of the issue as a collective problem and the public's acceptance of solutions to it.

A basic assumption applicable to the development of the major facilities proposed in this document is the need to apply a rigorous environmental impact assessment to them. To this end, the Corporation is proposing a comprehensive assessment scope applicable to both the central treatment and the storage/transfer facilities, recognizing that each represents a similar level of potential impact and risk. The results of preliminary work in this area relating to site evaluation, public health and safety, and transportation considerations are presented along with the proposed scope for the complete environmental assessment applicable to the final application. In proactively presenting this material, it is hoped that early and effective public input into the Environmental Impact Assessment (EIA) process and the appropriate regulatory guidelines requested can be obtained.

In summary, the Corporation is advocating the development of a planned and integrated system for the management of the province's hazardous waste. This proposal outlines the scope that system should take and provides the details applicable to the major facilities required. It is expected that the formal process of public and regulatory review initiated by the filing of this document will provide direction on its continued development.

1.0 INTRODUCTION

The Manitoba Hazardous Waste Management Corporation has reached the stage in the planning of an overall hazardous waste management system for the province where the major components of the required system have been identified, the scope of these developments can be defined in technical terms, and the conceptual options for their siting can be outlined.

Two general types of major facilities, each supported by appropriate infrastructure, emergency response capability and environmental monitoring, are proposed. These major facility components are:

a) A central treatment facility employing a range of physical/chemical treatment technologies to handle the provincially generated inorganic and aqueous organic wastes, supported by a secure repository for immobilized solid treatment residues; and,

b) A storage/transfer facility functioning as an accumulation point for waste material, and allowing its efficient and competent bulking for transfer to treatment and resource recovery facilities, either outside the province for organic materials or to the central treatment facility for inorganic materials. The facility will also make provision for long term storage of PCB contaminated material as capacity at existing secure storage facilities is exceeded and for various volume reduction, recycling and blending operations as the need is identified.

At this time, two conceptual siting options for these facilities are being pursued. The first involves the separate development of the two facilities with the storage/transfer facility being located in or near Winnipeg and the treatment facility being established on a stand alone basis in a rural setting in Southern Manitoba. The second involves the combination of the two facilities in or near Winnipeg.

In its fully developed form, two other components should also be integrated with these major facilities. The first is the capability to manage waste at source to the maximum degree practical. The second is a regional collection capability involving the establishment of collection points or depots around the province, likely in association with municipal waste management operations. The former has been to date, and should continue to be, a priority consideration as the overall system is developed. The latter is expected to be developed as needs outside of Winnipeg are identified and as improved facilities for solid waste management evolve throughout the province.

The purpose of this project proposal is two-fold. Firstly it is intended to summarize the overall system development work undertaken to date and to place documentation related to this work on the public record. Its presentation is intended to allow public, regulatory and policy confirmation of the overall concept, that being, the development of an integrated comprehensive capability to manage the province's hazardous waste.

Secondly, the proposal is intended to formally initiate the regulatory process leading to the consideration of specific facility development proposals. It is anticipated that such consideration will be made pursuant to The Dangerous Goods Handling and Transportation Act (being Chapter D12 of the Continuing Consolidation of the Statutes of Manitoba) and with the practice adopted by the Department of Environment, whereby such proposals are considered in accordance with the Manitoba Environment Act for purposes of environmental assessment. In this regard, the Corporation is requesting that the Department of Environment classify the major facility developments described herein and issue project specific environmental assessment guidelines in accordance with its practices under the Environment Act.

In soliciting the issuance of environmental assessment guidelines, the Corporation is requesting that the various siting and facility configuration options being pursued be taken into consideration in their preparation. This will allow the Corporation to proceed with the development of a detailed site specific proposal for one or both of the major facilities listed above. A final application or applications, defining the recommended facility configuration(s) and location(s) and requesting the appropriate approvals, will be submitted upon evaluation of siting options available for these facilities and completion of the appropriate environmental assessment.

As outlined in the Table of Contents, the project proposal document provides a background summary of the provincial hazardous waste management program up to the establishment of the Corporation as a system proponent as well as providing general background on the Corporation. The planning and development approach for the overall hazardous waste management system is then described, including characterization of the waste market to be served, the status of developing its various components and identification of major public policy issues affecting its future development. The concluding sections of the proposal describe the major facilities involved in this proposal, the process undertaken for siting them and a description of the proposed scope to be applied to the site evaluation and environmental assessment work to be undertaken in developing the final detailed site specific proposal(s) in the next stage of the regulatory review process. It is this latter material on which the Corporation is specifically soliciting both public input and regulatory guidance. The project proposal document is supported by three Appendices containing background information and more detailed technical documentation on work undertaken to date.

2.0 BACKGROUND

2.1 THE PROVINCIAL HAZARDOUS WASTE MANAGEMENT PROGRAM

Interest in hazardous waste management in Manitoba dates from the early 1970's. The Department of Environment and Workplace Safety and Health and its predecessors initiated several programs in this area related to such things as pesticides and chemicals in institutions. Among other things, this work involved the establishment of a temporary hazardous waste storage facility at Gimli, which has been available for pesticide residues and various chemical wastes collected through public programs operated by the regulatory authorities.

Examination of the hazardous waste issue began in a systematic way in 1982 with the initiation, by the provincial government, of a long term multi-phase hazardous waste management program. While Manitoba did not have the highly visible and controversial problems emerging in other more industrialized areas, the provincial government recognized that the potential for their development existed and a steady decline in environmental quality would result in the absence of a capability to manage such wastes. As a result, the process of establishing a planned and comprehensive hazardous waste management system for the province was started.

The overall program was designed to occur in three distinct stages:

a) Phase I - Develop an information base;

b) Phase II - Design and propose a system; and,

c) Phase III - Implement and operate the system.

From the outset, the program contemplated the development of an integrated "system" that provided for the minimization of hazardous waste through reduction, reuse, recycling and recovery at source, as well as addressing treatment and disposal of material not managed at source. In addition, it recognized the need for a comprehensive regulatory system governing not only the operating aspect of this system but also the generation of waste and the constraints placed on traditional alternatives for disposal of these materials. Finally, it was recognized that the program as a whole and the specific developments involved, required a very high level of public participation and input.

The first phase of the program was pursued from 1982 to 1987. It focused on the development of public awareness through a series of public hearings and a public symposium involving a wide range of interested parties. In addition, the Department of Environment and Workplace Safety and Health conducted a number of preliminary technical studies on the nature of the wastes generated in the province, the types of facilities that might be developed and a preliminary economic analysis of various generic facility options. At the same time, the basic regulatory framework for the control of hazardous waste was established. Phase I culminated in mid-1987 with the release of the final report of the public hearings held by the Clean Environment Commission (CEC). Appendix 1 provides copies of the various reports published by the provincial government in Phase I, including those relating to the public symposium, CEC hearings, departmental technical studies and regulatory development.

The general results of Phase I may be summarized as follows:

a) A preliminary estimate indicated that 20,000 tonnes/year of hazardous waste will be available to the provincial management system;

b) The estimated distribution of waste indicated a concentration in Winnipeg (40%) and in the neighboring eastern (23%) and western (25%) regions of the province;

c) Seventy-five percent of the waste was estimated to consist of inorganic materials. Organic waste accounted for the remaining 25%;

d) It was recognized that the estimated quantity, distribution and waste type requires verification, particularly with respect to the actual amounts and types of waste that a system will ultimately see, once the impact of both regulatory enforcement and source based waste management are better known;

e) The present disposition of these wastes is primarily to municipal sewer and landfill facilities. Direct treatment, storage or recycling account for a small proportion of wastes generated;

f) A public consensus exists that a management system for hazardous waste is required in the province;

g) The proponent of the overall hazardous waste management system should be a commercial public corporation operating independently from the regulatory authorities to which the proponent has regulatory approval and compliance obligations; and,

h) The specific form that the system should take requires further study, particularly with respect to its sizing, the technologies required, the economic basis under which it will operate and the location of its facilities.

2.2 MANITOBA HAZARDOUS WASTE MANAGEMENT CORPORATION

The Manitoba Hazardous Waste Management Corporation was created as a result of the information gathering and public consultation process in Phase I of the overall program. During Phase I, the Department of Environment and Workplace Safety and Health acted in both the capacity of regulator and proponent. However, once direct pursuit of system development was to be undertaken, as contemplated in Phase II of the program, it was recognized that a proponent separate from the regulatory authority was required to avoid an inherent conflict of interest.

The choice of a public corporation as this development proponent was made in part by the absence of any private sector alternatives. The choice was consistent with the preference of virtually all interested parties who expressed their views during the Public Symposium and the Phase I Clean Environment Commission hearings. Other supporting rationale reported at this time included a need to coordinate various system components, the coverage of liabilities inherent in the undertaking, assurance of equitable and universal access, provision of system security and continuity, public accountability and the need for public funding of the initial stages of system development.

The Corporation was created with the passing and proclamation of the Manitoba Hazardous Waste Management Corporation Act in November 1986 (Appendix 1). It was established as a commercial Crown Corporation, reporting through its Board of Directors to a responsible minister with its equity held by the Minister of Finance. Initial financing is provided through the provincial Loan Act with a maximum contemplated capital borrowing authority of $35 million. The Corporation is mandated to establish and operate a hazardous waste management system which will safely treat and dispose of hazardous waste in accordance with regulations and standards prescribed by the Minister of Environment.

The objectives of the Corporation, as set out in Section 3 of the Manitoba Hazardous Waste Management Corporation Act, are as follows:

(a) To establish, operate and maintain in accordance with all applicable laws in the province, a hazardous waste management system in Manitoba;

(b) To research, develop, establish, own, operate and maintain facilities for the transmission, reception, collection, examination, storage, treatment, recycling and disposal of hazardous wastes;

(c) To ensure that the hazardous waste management system is established, operated and maintained in a manner that will protect the health and safety of the public and preserve the environment; and,

(d) To ensure the protection of health and safety of the public and the preservation of the environment following the closure of the hazardous waste management facilities established as part of the system.

For purposes of fulfilling its mission and objectives, Section 4 of the Act provides the following powers:

(a) Acquire, own, develop, produce, process, recycle, treat, manage, utilize, conserve, store, transport or otherwise deal in or with hazardous wastes;

(b) Sell or otherwise dispose of any product produced in conjunction with the generation, treatment, processing or recycling of hazardous wastes;

(c) Participate with others in the activities mentioned in clause (a) to carry on joint operations with the other participants;

(d) Subject to this Act, acquire, hold, mortgage, alienate or otherwise dispose of land and any interest therein; and,

(e) Carry on any other business incidental to the business carried on by the Corporation calculated directly, or indirectly to enhance the value of, or render profitable, any of the property or rights of the Corporation.

The Corporation became operational in August of 1987. Since that time it has established itself as an independent organization having a professional staff of fourteen. While the major focus of its activity has been directed to the project management tasks involved in the development of a comprehensive provincial hazardous waste management system, the Corporation also provides a range of waste management services to both public and private sector clients.

The scope of these waste management services provided by the Corporation is summarized as follows:

a) Delivery of various public programs related to household hazardous waste, pesticide residue disposal and PCB collection services to smaller public institutions;

b) Technical advice and assistance to waste generators, specifically related to source based waste management and waste minimization;

c) Packaging, transportation and storage services for PCB contaminated waste on a commercial basis; and,

d) Provision of commercial collection, temporary storage and out of province brokerage services.

The operating assets available to deliver these services include the following:

a) A licensed storage facility at Gimli capable of short term storage of 264 barrels of material;

b) A licensed collection depot in Winnipeg capable of handling up to 35 barrels of material on a short term basis;

c) Access to Manitoba Hydro's PCB storage facility for PCB contaminated material originating from non-utility generators;

d) Transportation licences for the local movement of material within the province;

e) Regulatory authority to export waste to a number of licensed and pre-qualified treatment facilities in the United States and Eastern Canada; and,

f) Technical expertise in the form of trained dangerous goods technicians, chemists and chemical engineers to support the above operations and provide expert assistance to waste generators related to source based management.

As further background on the Corporation, copies of the most recent Annual Report and Corporate Profile are included in Appendix 1.

3.0 HAZARDOUS WASTE MANAGEMENT SYSTEM PLANNING

3.1 SYSTEM DEVELOPMENT STRATEGY

The concept of developing an integrated hazardous waste management system dealing with the issue from source through to treatment and disposal evolved directly from Phase I of the overall program. The first task undertaken by the Corporation was to prepare a strategic plan for developing such a system. This was based on a review of experience elsewhere, as well as the information developed in Phase I. This work has been documented in a report entitled "The Development of a Hazardous Waste Management System in Manitoba" which is contained in Appendix 2.

This work defined the basic requirements of the system as being able to:

a) Provide for the management of these wastes in a manner that protects human health and safety and environmental quality;

b) Be universally accessible in that it will handle all provincially regulated hazardous wastes presented to it;

c) Provide services as soon as possible in order to allow compliance with current regulations;

d) Encompass the complete spectrum of waste management options with the first priority attached to the management of waste at source through reduction, reuse, recycling and recovery;

e) Be affordable to its users in that its costs do not unduly penalize compliance with regulation, discourage use and/or impose economic disadvantage, while at the same time leaving economic incentive to encourage waste minimization at source;

f) Be accessible on an equitable basis within the province such that service is provided on the same basis regardless of waste generation location or amount of waste produced;

g) Be affordable to the taxpayer in recognition that the public financial resources available are limited and therefore, it must be developed and operated with the optimum level of public expense, financial risk and control; and,

h) Be pursued with a high degree of public involvement, input and acceptance.

Examination of the experience elsewhere shows that a number of constraints and risks exist in attempting to satisfy these requirements and these need to be addressed in the planning of a system. More specifically, the lessons learned from this experience include:

a) Uncertainties exist respecting the actual size of the waste market, leading to the risk of incorrect sizing of facilities and duplication of services;

b) A significant portion of the potential waste market is most economically serviced by source based waste management strategies;

c) The economic viability of a system is enhanced by maximizing the size of the market accessed and is limited by restrictions on movement of wastes between jurisdictions;

d) An economically viable system, accepting all waste presented to it (i.e. a universal system), requires access to more profitable waste streams in order to offset the cost of servicing small and remote generators and inherently less profitable waste streams;

e) A degree of public financial support will likely be required for any universal and equitably accessible system at least in the form of funding initial development costs, provision of supporting infrastructure, liability coverage and subsidy of some publicly generated waste streams;

f) System viability requires a comprehensive and consistently applied regulatory system, including strong enforcement capability at both municipal and senior government levels;

g) The major traditional constraint to developing the facilities required for such a system has been the inability to site them, something that has been largely a result of public resistance;

h) The successful siting of system facilities requires the development of public acceptance and understanding at a local level as well as the sustained public policy commitment of governments; and,

i) The time required to put a system in place has historically ranged from 5 to 10 years, depending on the level of public acceptance achieved and the sustainability of public support.

Based on these requirements and the constraining factors involved, the overall operational components of a conceptual hazardous waste management system were defined as:

a) Source Based Management Capability - This component covers the physical capability to deal with regulated wastes at their source through the application of reduction, reuse, recycling and recovery techniques, such that waste generation is minimized in the first place and the amount requiring off-site management is as small as practical;

b) Collection Infrastructure - This component covers the physical capability to collect, transport, store, consolidate and analyze those materials requiring off-site management, on a province-wide basis;

c) Treatment and Disposal Facilities - This component covers the facilities required to treat materials requiring off-site management such that their potentially hazardous properties are either eliminated or their potential impacts minimized. This typically covers the treatment of inorganic materials using various physical and chemical technologies and the treatment of organic materials using thermal technologies such as high temperature incineration. Also included in this component are the facilities required to stabilize or immobilize solid residues from these treatment processes and the secure repository in which they are placed. Such facilities can also accommodate volume reduction and resource recovery capability; and,

d) Assurance Capability - A final operational component that any system should incorporate into the above facilities is provision for full operational disclosure and environmental monitoring of performance consistent with a perpetual care philosophy. This component has traditionally been lacking in the development of such systems and is viewed as fundamental to the acquisition and maintenance of public acceptance of them.

It was also recognized that a broad definition of the system should acknowledge and include the need for regulatory and social components. In particular, the development of the operational components must be accompanied by sustained public acceptance and public policy support of their need as solution to a collective environmental problem. Similarly, the existence and enforcement of regulations controlling the generation and management of these materials, by both municipal and senior governments, is fundamental in supporting the viability of the system's operational capability.

From the outset, it has been recognized that the system required in Manitoba would not necessarily justify all of the operational components defined above, either in the near or longer term. Therefore, in order to avoid the inherent risks in overdeveloping off-site facilities, the Corporation has adopted an incremental strategy to its development activities. The system was conceptually envisioned as developing in at least three stages, consistent with this incremental approach. Stage 1 involves the planning and evaluation of system feasibility, which is currently being undertaken. This stage will culminate in the submission of a specific development proposal(s), covering the initial facility requirements, such that they can be subject to public and regulatory review. The following stage would involve the construction of basic system facilities identified as being required immediately (Stage 2), with additional capability being incorporated as the need is identified and justified (Stage 3).

The strategy adopted for Stage 1 involves the priorization of source based management as being the area of maximum effect with the least investment, along with acquisition of better data related to the nature of waste generation in terms of amount, nature and geographical distribution. The priorization of this work allows the subsequent detailed development work on those components required in the near term to be based on as accurate information as possible. Initial off-site facilities work has focused on developing the interim collection infrastructure in the form of storage facilities and collection depots. At the same time, the development of the conceptual technical definition of the more major facilities was initiated. Finally, planning for the siting of these facilities has been undertaken in recognition that facility siting constitutes a major timing and social constraint to ultimately developing any integrated system.

A basic principle in this development strategy has been that facility development should provide for the maximum degree of flexibility respecting future requirements. Consistent with the incremental philosophy, this recognizes the inherent uncertainties respecting future requirements in a number of areas including:

a) The desire to maintain source based management as a priority and to avoid detracting from it by over developing off-site facilities;

b) The evolution of regulatory requirements on what materials require management and how this is to be done;

c) Long term access to current and future treatment and disposal capability in other jurisdictions;

d) The development of new technologies for the management of these materials; and,

e) The potential development of specialized hazardous waste facilities by others, independent of the overall system.

The results of the conceptual technical studies on facility components and a review of the incremental approach are included in Appendix 2. The Corporation's market study and facility siting work are discussed in following sections.

3.2 WASTE MARKET CHARACTERIZATION

The detailed basis for the facilities covered by this proposal result from the waste market characterization work initiated early in the system planning stage of the system's development. The detailed results of this work are contained in Appendix 2 and are discussed below in the context of what operational components are required in an integrated system.

The waste characterization information was obtained from a confidential survey of individual waste generators. One hundred and eighty-five organizations identified as potentially major generators and a representative selection of 1130 minor generators were contacted. Data were received from 71% and 28% of those surveyed in the two categories respectively. In many cases, direct technical assistance was provided in the development of waste generation data. The results were classified as to type, industrial sector producing it and potential management options available. Extrapolation of the sample was undertaken where direct data from known generating sources was lacking and the probable waste streams characteristics of the source could be identified. The results provided an updated measure of the regulated hazardous waste generated in the province, along with a critical assessment of what can realistically be captured by the system and its specific components.

The results reported directly from waste generators are provided in Table 3.1, using a waste classification system designed to segregate wastes by treatment option (CUCD Code). The results directly identify 178,290 tonnes/year of material. This quantity was adjusted by extrapolation to the complete range of anticipated generators. The predominant waste stream is inorganic in nature and is typically disposed of in sewer systems. This alternative will not be available when current regulations are fully enforced. However, these are mainly dilute solutions and as such are amenable to a high level of volume reduction at source, something that could be expected with the anticipated level of regulatory enforcement and higher costs associated with off-site treatment.

Table 3.2 provides the estimated quantities after an analysis of each waste stream was discounted for the expected application of source based management. The resulting quantity of 22,679 tonnes/year provides an estimate of the amount requiring some form of off-site management provided by an overall system. This consists of 13,257 tonnes/year of inorganic material and 9,422 tonnes/year of organic material.

Within the organic category, it is estimated that 6462 tonnes/year of material would be suitable for management by a resource recovery management option such as recycling, or use as auxiliary fuel, and 2960 tonnes/year would require incineration. The high proportion of organic waste available for resource recovery is based on the predominance of waste oil in the organic estimate and the assumption that this can be accommodated by this management option.

The source of these wastes was also estimated by geographical region and generating industrial sector. In geographical terms, the data indicate that the Winnipeg region generates 84% of the volume identified. This is significantly greater than earlier estimates (Appendix 1), something that reflects both the more discriminating approach adopted in the current work and a higher level of generator awareness in Winnipeg. In terms of generating sources, Table 3.3 provides a summary of estimates of waste requiring off-site management by major Standard Industrial Classification (SIC) category. This indicates that small to medium size industries in the metal fabrication and service sectors will be the major source of waste, rather than larger industries. This reflects the greater ability of larger organizations to manage waste at source.

TABLE 3.1

Basic Waste Market Survey Data

CUCD	Waste Type	Reported Quantity (tonnes/year) Majors	Minors	Total
1	Organic Sludges	175.6	2.5	178.1
2	Solvents	368.4	57.1	425.5
3	Oils & Greases	597.2	264.2	861.4
4	Oil/Water Mixtures	36.0	0.5	36.5
5	Organic Residuals	0.2	1.4	1.6
6	Inorganic Solutions	156,618.8	772.5	157,391.3
7	Misc. Chemicals	25.3	75.2	100.5
8	Paint Residuals	276.0	14.1	290.1
9	Aqueous Organics	13.4	39.2	52.6
10	Anion Complexes	18,657.4	0.0	18,657.4
11	Inorganic Sludges	263.9	0.0	264.0
12	Pesticide & Herbicide	0.0	2.3	2.3
13	PCB Waste	16.2	0.1	16.3
14	Clean-up Residuals	2.4	10.0	11.4
	Total Survey	177,050.9	1,239.1	178,290.0

TABLE 3.2
Total Estimate of Waste Quantities Requiring Off-Site Management

CUCD	Waste Type	Quantity (tonnes/year)
1	Organic Sludges	299
2	Solvents	708
3	Oils & Greases	5,668
4	Oil/Water Mixtures	1,026
5	Organic Residuals	86
6	Inorganic Solutions	2,993
7	Misc. Chemicals	71
8	Paint Residuals	639
9	Aqueous Organics	666
10	Anion Complexes	6,138
11	Inorganic Sludges	4,034
12	Pesticide & Herbicide	12
13	PCB Waste	16
14	Clean-up Residuals	44
15	Pathological Waste	279
	Total Extrapolated	22,679

TABLE 3.3
Waste Quantities Requiring Off-Site Management
By Standard Industrial Classification

SIC	INDUSTRY	QUANTITY(t/y)
07	Agricultural Services	77
10	Mining	430
13	Oil & Gas Extraction	42
14	Quarrying	28
20	Food & Kindred	17
24	Lumber & Wood	163
25	Furniture	104
26	Paper & Allied	72
27	Printing	334
28	Chemicals	2041
29	Petroleum Refining	8
30	Rubber & Plastics	66
31	Leather	136
32	Stone Glass & Clay	109
33	Primary Metals	2272
34	Fabricated Metals	7325
35	Machinery	893
36	Electrical Machinery	467
37	Transportation Equipment	250
40	Railroad Transportation	1956
41	Local Transportation	98
42	Motor Freight Transport	1893
44	Water Transportation	18
45	Air Transport	60
46	Pipelines	1
48	Communication	5
49	Utilities	162
55	Service Stations	1339
72	Personal Services	239
73	Business Services	174
75	Auto Garages	1093
76	Repair Services	108
80	Health Services	285
82	Educational Services	68
90	Public Administration	172
99	Unspecified Industries	176
	TOTAL	22,679

In developing this information, a number of uncertainties exist respecting the quantities and general management options for specific waste types, notably waste oil, PCB contaminated material, and biomedical waste. The following provides a discussion of these:

a) Waste Oil

The quantities estimated are from major industrial sources and underestimate the total generation of this material. Some estimates place the total as high as 10,000 tonnes/year. The status of this material as a regulated hazardous waste remains uncertain pending the issuance of regulations specifically covering it. Based on input from provincial regulatory authorities and the regulatory practices evolving in other jurisdictions, it is assumed that this material will ultimately be treated as a hazardous waste in terms of regulatory control. As such, it should be viewed as a material potentially requiring management in any overall system. However, the ability to capture the total amounts produced will require the development of a dedicated infrastructure, something that could form part of an overall system's regional collection capability.

b) PCB Contaminated Material

Table 3.1 indicates 6.3 tonnes of PCB waste reported by survey respondents, which extrapolates to 16 tonnes in Table 3.2. The actual quantity of PCB waste (transformers, capacitors, light ballasts, contaminated soils and other equipment) currently in storage in Manitoba as indicated in Federal and Provincial inventories is 731 tonnes. There is an estimated 1989 tonnes of PCB equipment (transformers and capacitors) remaining in service in Manitoba. Definitive estimates for PCB light ballasts currently in use are not available but based on the rate at which the Corporation is being requested to provide packaging and storage capability for this material, an estimated generation rate of 20 tonnes/year can be assumed.

PCB contaminated material is subject to both overall regulation and specific restrictions at both the provincial and national level respecting its storage, movement, and treatment. Currently, no accessible treatment capability is available in Canada except for mineral oils having low levels of contamination. Similarly, export of the material to the United States and other countries offering treatment capability is prohibited. For this reason, the only management option for most of this material is secure storage pending the development of incineration capability elsewhere in the country. This storage is currently provided either by Manitoba Hydro at a central facility in Winnipeg or by individual generators of the material. Given the public policy priority to phase equipment containing PCB's from service, the regulatory desire to minimize the number of storage locations and the apparent limitations on available storage, increased capacity for these materials may have to be provided by the system.

c) Biomedical Waste

Biomedical or pathological waste has traditionally been managed within the health care system and it has only recently been redefined as "biomedical waste" for inclusion as a hazardous waste in regulatory terms. For this reason, the data reported in the waste characterization information does not reflect the likely amount produced. Pathological waste is included as a portion of CUCD 14 (Clean-up Residuals) in Table 3.1. It was considered necessary to separate this from the other CUCD 14 wastes by creating a new category, CUCD 15 (Pathological Waste) for extrapolation purposes in Table 3.2. Only laboratory and known infectious wastes were included in the survey data as opposed to other types of wastes generated by human or animal care facilities, medical research and teaching establishments and clinical laboratories which are now covered by the biomedical waste definition. A separate investigation undertaken with the Manitoba Health Services Commission indicates that an estimate of 2200 tonnes of biomedical wastes are generated annually, based on health care facilities in Manitoba operating at full bed capacity.

For purposes of planning the overall system, the Corporation is assuming that biomedical waste will continue to be handled within the health care system. In effect, its management is considered to be a source based activity within the context of the overall system. However, it is recognized that either upgrading and expansion of existing incineration facilities, or the development of new centralized facilities is required. The evaluation of these requirements is currently being undertaken by the major health care institutions in Winnipeg in conjunction with the Manitoba Health Services Commission. The Corporation is cooperating in this work to ensure consistency with the overall system development work that it is undertaking.

In summary, the waste market data presented here represent the best current estimates on which the system planning can be based. However, it is recognized that the estimates will continuously change as regulatory enforcement and general generator awareness increases, and as generators adopt source based measures. For this reason, the specific facilities proposed for the system should retain the flexibility to respond to these changes. In this regard, the sizing of the major facilities described in the following section will be subject to review during final design, based on current market estimates and the level of regulatory enforcement apparent at the time.

3.3 SYSTEM DEVELOPMENT PLAN

On the basis of the above waste characterization work, a number of conclusions related to the detailed nature of the system to be developed have been drawn.

- The source based management component should remain as the first priority in the system's development. The analysis of the overall quantities of waste generated indicates that in excess of 85% of the total volume can be managed at source, primarily through the treatment and volume reduction of aqueous inorganic material.

- The system will require a collection infrastructure, integrated with both source based and off-site components to pick up, transport, accumulate and transfer material requiring off-site management. Given the high concentration of waste generation in the Winnipeg region this infrastructure should be centered there, while making provision for regional infrastructure.

- A significant volume of inorganic material will require off-site treatment and disposal, and this could be done in the province using conventional physical/chemical treatment technology.

- The majority of organic material identified as requiring off-site management should be directed to resource recovery capability, currently available outside the province, but which could potentially be developed within the province, in association with existing industrial operations or dedicated recycling facilities.

- The organic material requiring a dedicated treatment facility in the form of an incinerator is insufficient to justify its development in the province and the collection infrastructure should provide for its export to economically scaled incineration facilities elsewhere, conditional on continued commercial access to such facilities.

On this basis, the basic system facilities required have been identified as a relatively large storage/transfer facility located in or near Winnipeg and a physical/chemical treatment plant, either located in association with the storage/transfer facility or elsewhere in the province. It is these facilities that this proposal specifically relates to and which are more fully described in the following section. In addition, smaller collection points in the form of collection depots or small transfer stations will ultimately be required on a regional basis. These could appropriately be developed in association with municipal waste management facilities and serviced by a coordinated transportation capability operating in association with the more major facilities noted above.

It is recognized that the full enforcement of current regulations is limited by the availability of competent and comprehensive management facilities. For this reason, the storage/transfer and central treatment facilities are required as soon as possible, such that an environmentally sound alternative to current practices is provided. Expeditious development could have either or both in operation by 1992, subject to siting and regulatory approval. Planning studies related to the regional collection capability are to be undertaken in 1990 with the licensed collection depot operating in Winnipeg potentially serving as a model for these facilities. It is expected that this support capability will be constructed in later stages as the need develops.

The development of off-site facilities is being undertaken in parallel with the promotion and pursuit of source based capability. Current work in this area involves the provision of technical assistance to generators through waste audits and identification of technologies applicable to waste reduction. Other potential initiatives include the development of collective capability among a number of generators having common wastes, joint venture investment in such source based facilities and provision of mobile waste reduction services. The coordination and integration of source based development with that pursued off-site is particularly important in the correct sizing of off-site capability, as well as ensuring that these developments do not create a disincentive to the future evolution of waste management at source.

In developing this overall plan for the system, two areas of public policy remain open for resolution as the development proceeds. The first relates to the market scope that the system addresses. The planing to date is based on the assumption that the market served is limited to Manitoba. This assumption is reflected in the design capacities of the major facilities described in this proposal. However, the system plan also assumes the export of organic wastes, as opposed to developing treatment capability for it in the province. This may mean that some consideration of accepting wastes from other jurisdictions, at least on a reciprocal basis, may be appropriate in the future. In addition, it has also been assumed that the proposed system facilities will not duplicate competent capability that may already exist, recognizing that the development of selective capability can detract from the economic viability of the system and may create a variation in the quality of services provided.

The second area relates to the ownership of and/or operating responsibility for the major system facilities. The planning and development work undertaken to date by the Corporation has not made any assumptions in this regard. A number of options exist in this area. On one hand, the system could be developed as a regulated utility, operated by either the public or private sector. On the other, the facilities involved could be entirely developed on a competitive basis by the private sector. A range of intermediate options involving a mixture of private and public ownership and/or operating responsibility also exist.

Each option has advantages and disadvantages. For example, a purely public option will require a greater amount of initial capital investment but potentially maximizes public control and financial protection respecting future liabilities, as well as offering a greater degree of integration, comprehensiveness, accountability and public support. A purely private option minimizes the initial investment of public funds but will tend to be more selective in the scope of service provided, will meet greater public resistance in developing capability, will have less capacity to provide for contingent liabilities and may involve a greater variation in the quality of services provided. While the selection of the specific option is ultimately a public policy decision, retention of the concept of having a planned, integrated and comprehensive system, as opposed to ad hoc development of capability, is advocated by the Corporation and should be the basis of any business structure selected.

It should also be noted that the ultimate resolution of both the scope of the market served by the system and the business structure used to develop it will influence or be influenced by the configuration selected for the system. For example, the selection of a combined facility as opposed to separate storage/transfer and central treatment facilities will tend to be more attractive to outside investment. Similarly, the less public policy constraint applied to the market scope, the greater the external investment potential.

4.0 PROPOSED SYSTEM FACILITIES

4.1 INTRODUCTION

This section provides a technical description of the major off-site facilities proposed for the system. The first two subsections describe the central treatment and storage/transfer facilities as they would be developed separately on a stand alone basis. The final subsection describes the combined facility option, focusing primarily on how the two components (treatment and storage/transfer facilities) would be integrated.

The planning, design, construction and operation of the system and its facilities will be undertaken in compliance with all pertinent acts, regulations, codes, guidelines and objectives of the Province of Manitoba. In addition, applicable federal regulations will be complied with. The major legislation affecting the various aspects of system development including that anticipated to be enacted are outlined in Table 4.1. A further comprehensive review of the legislation and pursuant regulations will be undertaken prior to submission of any final application for system facilities to ensure full compliance provisions are incorporated into the Environmental Impact Assessment, facilities design and operating procedures.

Fundamental to the operation of the overall system and the integration of all its facility components is the establishment of a waste acceptance and control protocol to ensure proper identification and appropriate handling, transportation and treatment of all wastes entering and moving through the system. The basic principles involved in this are now applied to the Corporation's current operations and would be extended to encompass the acceptance and control of these materials as they move through the proposed facilities.

The main components of the protocol are outlined below:

- All generators of waste being serviced by the system must be registered as such with the Department of Environment, except where exemptions for regulatory authorities and small quantity generators apply;

- Prior to acceptance into the system, the generator must provide a completed Material Characterization Data Sheet (MCDS) fully defining the analysis of the material and a representative sample of the material such that verification, as required, can be performed;

- Where materials are not routinely handled by the system, a treatment option analysis will be performed to determine the optimum treatment procedure, prior to acceptance;

- Wastes will only be accepted if labelled and packaged in accordance with the applicable regulations, something that may be undertaken by the system operator as part of the commercial service provided;

TABLE 4.1
ACTS AND REGULATIONS

LICENCING

The Dangerous Goods Handling and Transportation Act S.M. 1984 c. 7
The Environment Act S.M. 1987, c.26

DESIGN AND CONSTRUCTION

The Buildings and Mobile Homes Act S.M. 1974, c.54-Chap. WB93
The Fire Protection Act S.M. 1986 c. F80
Workplace Safety and Health Act S.M. 1987 c. 210

OPERATION

Workplace Safety and Health Act S.M. 1987 c. 210
Pertinent Regulations:

- First Aid MR 101/88
- Hearing Conservation and Noise Control MR 103/88R
- Sanitary and Hygiene Welfare MR 104/88R
- Workplace Hazardous Materials Information System MR 52/88
- Workplace Health Hazard MR 53/88
- Workplace Safety MR 108/88R

The Dangerous Goods Handling and Transportation Act S.M. 1984, c.7
Pertinent Regulations:

- Handling, Offering for Transport and Transporting of Dangerous Goods MR 172/85, MR 141/88
- Classification Criteria for Products, Substances and Organisms MR 282/87
- Generator Registration/Carrier Licencing MR 175/87, MR 140/88
- Environmental Accident Reporting MR 439/87
- Manifest Regulations MR 139/88
- PCB Regulations MR 474/88

The Environment Act
Pertinent Objectives and Guidelines:

- Manitoba Surface Water Quality Objectives
- Atmospheric Emission Criteria - Objectives and Guidelines for Various Air Pollutants
- Ambient Air Criteria - Objectives and Guidelines for Various Air Pollutants

The Clean Environment Act S.M. 1972, c.76 C-130
The Pesticides and Fertilizers Control Act S.M. zC.z40
The Public Health Act S.M. 1970, c. P210
The Highway Traffic Act S.M. 1985-86 c. H60
The Fire Prevention Act S.M. 1986 c. F80

FEDERAL ACTS AND REGULATIONS

Environmental Protection Act S.C. 1989

- Storage of PCB Wastes - Interim Order
- Export and Import of Hazardous Waste Regulations (Draft)

The Ocean Dumping Control Act S.C. 1974-75-76, c. 55
The Pest Control Products Act S.C. 1968-69 c.z50

- All collection and transportation within the system will be coordinated by the system operator, be performed by carriers licensed to transport hazardous waste, be manifested in accordance with transport of dangerous goods requirements and will use appropriately trained personnel;

- Upon arrival at the system facilities, each waste shipment will be sampled and verified against its MCDS and manifest information, prior to formal acceptance at the facility;

- Current inventories, complete with characterization and Material Safety Data Sheet information will be maintained for system facilities, and be immediately accessible to regulatory and emergency response authorities;

- Where materials are being treated at the system's facilities, its routing through the facility will be documented and certification of treatment will be provided to the original generator and made available, as required, to the regulatory authorities;

- Where materials are being directed to treatment and disposal facilities outside the province, the control protocol will follow that proposed in the anticipated federal regulation governing the export of waste (Table 4.1) and that applied in the specific jurisdictions involved. As a minimum this will include:

    - Routing to licensed and prequalified facilities operating in compliance with regulations within their jurisdictions and any equivalency requirements imposed by jurisdictions of origin;

    - Use of licensed carriers for the transfer of the waste shipments;

    - Adherence to pre-clearance, notification and reporting requirements of all affected jurisdictions;

    - Manifesting of all shipments, including traceability of all components back to the original generator; and,

    - Documentation of the final disposition of the material and its availability to the original generator and, as may be required, to regulatory authorities.

4.2 CENTRAL TREATMENT AND DISPOSAL FACILITY

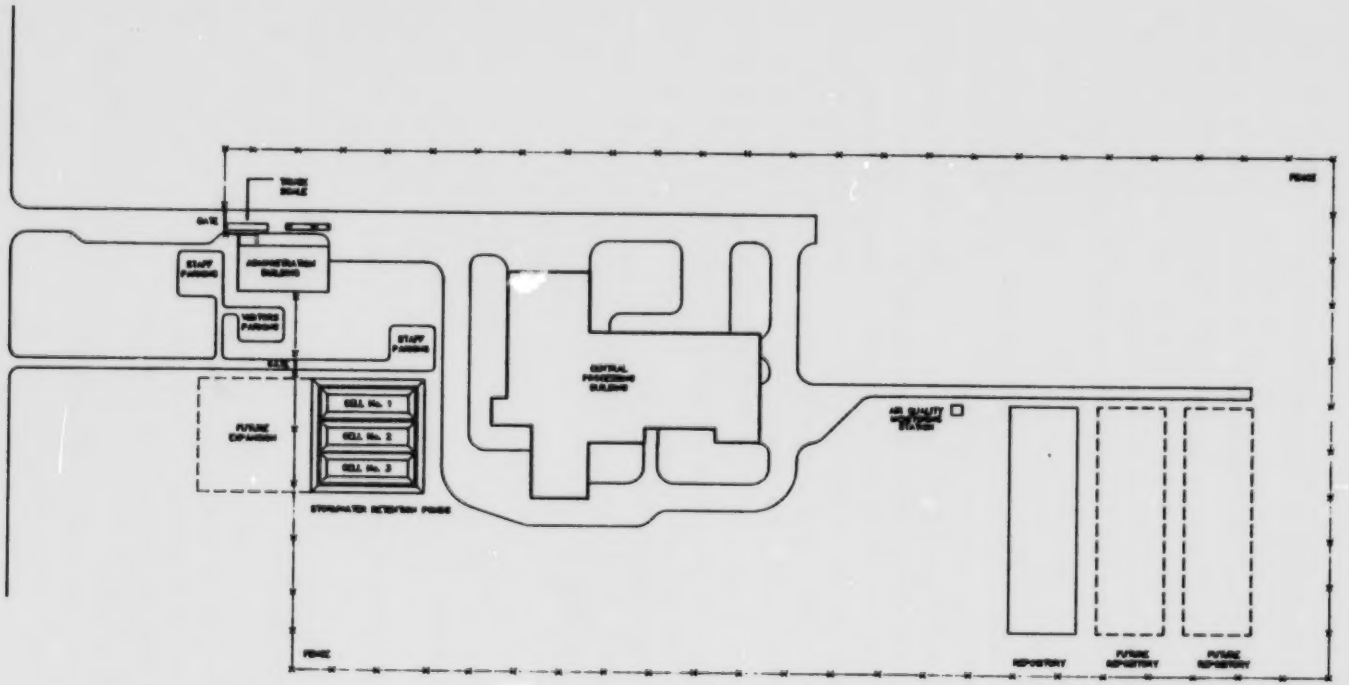
4.2.1 Facility Overview and General Operation

This section describes the central treatment facility as developed on a stand alone basis. The purpose of this facility is to treat commonly encountered inorganic and aqueous organic wastes and provide for the safe disposal of any residues resulting from the treatment processes or operation of the facility. Figure 4.1 provides the general layout of the basic central treatment facility developed on a stand alone basis. A model of the overall facility is illustrated in Figure 4.2.

The facility site will occupy a 14 hectare (35 acre) developed area, secured by a fence within which drainage and access are controlled. The layout depicted and described is generalized with the finalized configuration to be optimized on a site specific basis to suit topography, hydrogeological conditions, off-site infrastructure, access and other factors specific to a chosen site. It should be noted that an area larger than required for the development should be acquired, recognizing the need for a degree of land use control adjacent to the facility, to allow for optimization of the plot plan orientation and to provide expansion flexibility. For example, 65 hectare (160 acre) sites are being optioned for rural sites. While this amount of land may not be available for urban siting alternatives, land with appropriate development controls surrounding it is desirable.

The principal components of the facility include:

- Administration Building containing:
  - Offices;
  - Site access control and security; and,
  - Weigh scale.
- Main Operations Building containing:
  - Materials receiving;
  - Materials storage;
  - Inorganic physical/chemical treatment plant;
  - Organic physical/chemical treatment plant;
  - Solid treatment residue immobilization plant;
  - Liquid residuals (water) treatment plant;
  - Laboratory; and,
  - Operating plant support infrastructure.



SCALE

no.	date	revision	by	chkd

no.	date	revision	by	chkd

Manitoba Hazardous Waste Management Corporation

Reid Crowther

Reid Crowther & Partners Ltd.

project: Facility Design Specification and Technology Characterization

CENTRAL TREATMENT FACILITY LAYOUT

designed: D.A.T.	scale:	date: 89-10-10
drawn: S.G.		project no.: 01350
checked: A.W.H.		drawing no./figure: 4.1
approved:		rev.

MANITOBA HAZARDOUS WASTE MANAGEMENT CORPORATION

Proposed Central Treatment Facility

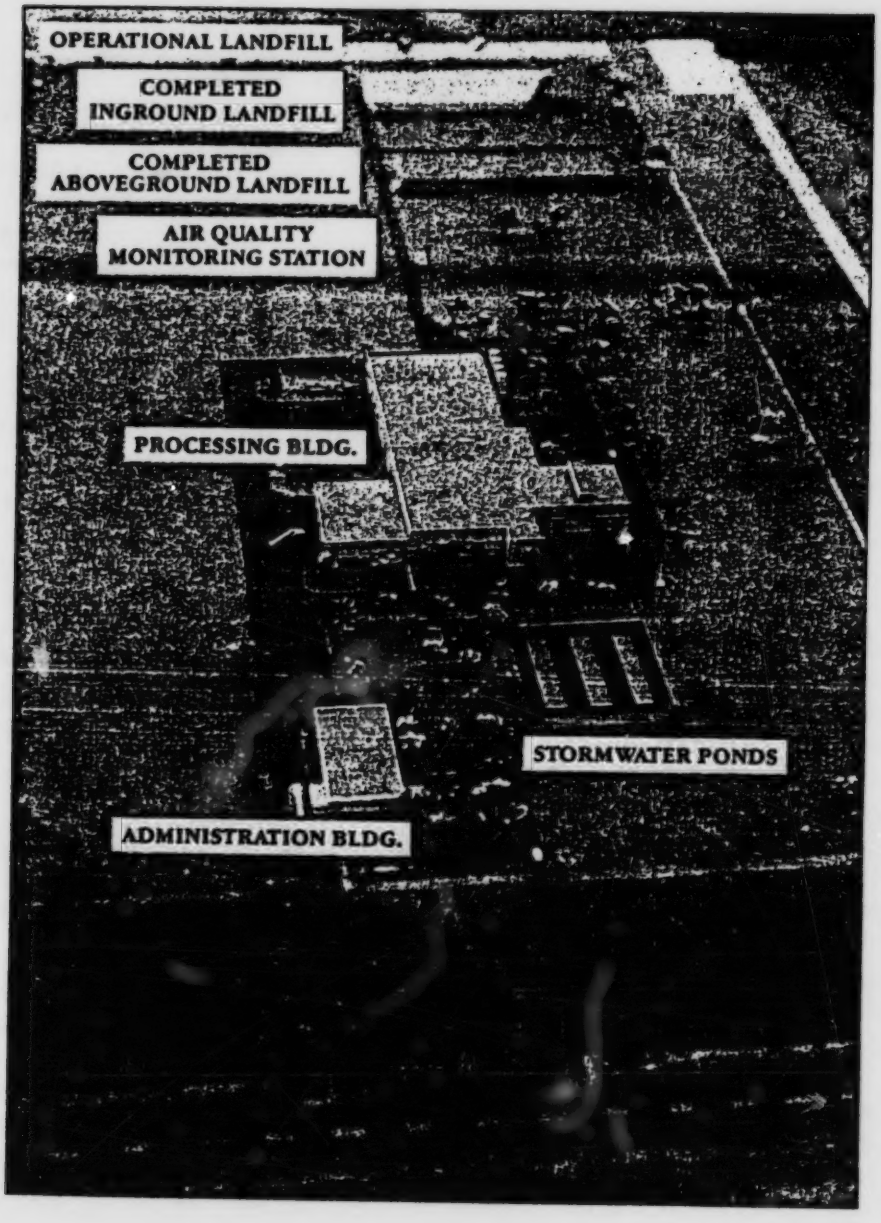


Figure 4.2

- Solid Treatment Residue Repository including:
  - Housed active secure repository cell; and,
  - Completed secure repository cells.
- Site control, protection and monitoring including:
  - Surface water collection and segregation system;
  - Environmental monitoring systems;
  - Emergency response capability;
  - Data management system;
  - Process control;
  - Fire detection and protection; and,
  - Safety and security.

Figure 4.3 illustrates the overall flow of material in the facility. Waste materials will be received at the facility by the truck load. Based on the design capacity, this would involve 3 truck movements per working day into the facility. Upon receipt, wastes are segregated in the unloading area for verification of material identity through fingerprint analysis. Bulk liquid materials will be unloaded directly into dedicated storage, while drummed materials will be unloaded and transferred to bulk storage tanks prior to treatment. Empty drums will be decontaminated for reuse or disposal. Solid materials undergoing direct immobilization will be unloaded and stored in the immobilization plant prior to treatment. In addition to treating materials from waste generators, the facility will include provision for treating contaminated surface drainage and landfill leachate, if required, and wastes generated through routine facility operations.

The inorganic physical/chemical treatment plant provides dedicated reaction trains for both cyanides, and acids and bases, to ensure that noncompatible materials cannot be inadvertently combined. The reaction vessels offer the capability for acid neutralization, cyanide destruction, hexavalent chromium reduction, metals precipitation and solids separation. Bulk reagent tanks will provide the necessary chemical additives to promote the treatment process.

The aqueous organic physical/chemical waste treatment plant provides the capability to pretreat aqueous organic materials. Concentrated organic contaminants from this process will be sent off-site for incineration, whereas the liquid effluent will be treated in the liquid residual treatment plant.

In addition to monitoring the various reactions for process variables such as temperature and pressure, sample points will provide the capability to analyze for pH, metals content, and reaction confirmation, all of which will be undertaken in the facility laboratory.

Once reactions have been completed, the materials are transferred to filter feed tanks, where they are subsequently passed through a plate and frame filter press. The liquid stream passes through to the liquid residuals treatment plant, while the solids are trapped in a filter cake, which undergoes further treatment in the immobilization plant.

Treated liquid residuals will be reused as process and service water to the maximum extent possible. Excess water will be evaporated and condensed, and subsequently discharged. Treated effluents which fail to meet treatment objectives for either reuse or discharge will be retreated in the treatment plant, or solidified if the residual contaminants are inorganic in nature.

Treated solid residues from the physical/chemical treatment processes will be chemically and physically immobilized by means of a pozzolanic process. This solidified material will then be transferred to the residue repository.

The residue repository will consist of a lined cell, with leachate detection and collection systems. During its active life, each cell will be sheltered with a portable structure to prevent exposure to precipitation. Completed cells will be capped with a liner system, to prevent water infiltration into the cell.

In addition to the treatment operations, the main operations building will house the control centre, facility laboratory, support facilities for operating staff and utilities. The mechanical room will house heating, ventilation and air conditioning equipment, as well as the vent gas and exhaust air cleaning systems associated with storage tanks, reaction vessels, and reagent storage tanks.

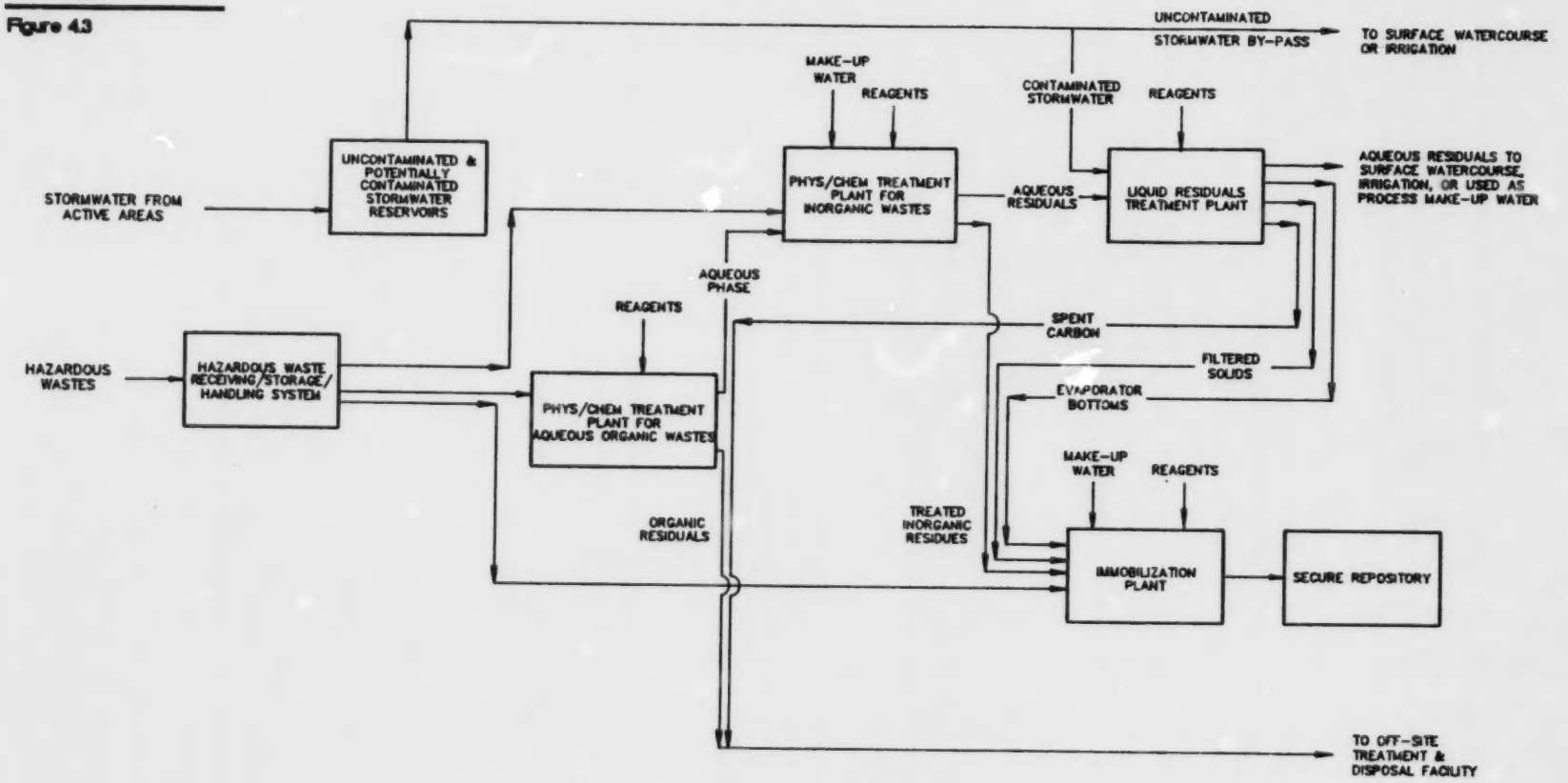
Site control, protection and monitoring systems to be incorporated into the facility include surface water collection and segregation systems, process, emission and ambient environmental monitoring systems, and emergency response capability. These systems will ensure the safety of site personnel, the environment in general, as well as the integrity of the facility.

With respect to operation staffing, twenty-five personnel will be associated with facility operations in a direct capacity, with a further ten involved indirectly. Positions include:

- Management/Supervisory:
  - Plant overall;
  - Engineering/Operations; and,
  - Administration.
- Technical Professionals:
  - Engineers;
  - Chemists; and,
  - Occupational Hygienist/Nurse.

Central Treatment Facility
Overall Operations
Flow Diagram

Figure 4.3



- Operations Staff:
  - Lab Technicians;
  - Instrument Mechanics;
  - Maintenance Technicians; and,
  - Process Operators.
- Administrative Staff:
  - Purchasing;
  - Clerical; and,
  - Secretarial.
- Support Staff (Indirect):
  - Security;
  - Building Maintenance;
  - Grounds Maintenance; and,
  - Transportation.

Preliminary cost estimates, based on the initial design, indicate that the stand alone central treatment facility involves a direct capital investment of $23.5 Million, excluding financing and capitalized development costs. The annual operating costs are estimated to be $5.2 Million.

In the following, the design philosophy and basis applied to the facility is summarized and each of the major components and operating systems are described in detail.

4.2.2 Design Philosophy and Basis

The central facility design is based on the following principles:

- Facility design and operation shall be in accordance with all pertinent acts, codes and regulations applicable to the development;
- Material received by the facility will be treated such that their hazardous or undesirable properties are effectively eliminated or minimized;
- All by-products of the facility's operation, and particularly those resulting from the treatment processes, will be suitable for reuse in the facility, be released without environmental consequences, or be securely contained to prevent their release;
- Design and operation of the facility will provide for protection of all potential paths of environmental contaminant exposure;
- The capability to demonstrate provision of this high level of environmental and human protection shall be provided for during operation and subsequent to the closure of any facility components;

- In achieving the above, the facility shall employ proven commercially available technology, while recognizing the potential for technical innovation and improvement in the future;

- The facility shall be designed to provide a high level of redundancy and backup such that operability and on stream time is maximized;

- The design shall maximize flexibility and expandability in recognition of uncertainties in waste type and quantity to be provided for as the market evolves in the future; and,

- The facility design shall facilitate the ability to fully control and track the course and disposition of all material throughout the operation and provide for full public access to the operation.

The design basis adopted for the facility incorporates the following considerations:

- The design capacity of the treatment facility will be 12,000 tonnes/year of inorganic material and 1500 tonnes/year of aqueous organic material assuming a conventional single shift operation, with initial increases in capacity and flexibility being provided by shift additions as required;

- A range of basic physical and chemical treatment processes are to be incorporated such that effective processing regimes are available for the customized batch treatment of commonly received material and any by-products produced;

- Provision shall be made for the maximum utilization of water resulting from treatment processes and that which is not reused shall be treated on-site to a level suitable for surface discharge;

- Continuous performance monitoring of all process operations will be included, along with control of process parameters and provision for warning and shut down;

- The design will recognize the "extreme continental" climate classification of Southern Manitoba and in particular will place as many operations indoors or in sheltered areas as is practical;

- Surface water run off will be collected from the developed portions of the site such that it can be monitored prior to release, and treated in the event of contamination;

- Provision will be made for analytical identification of all materials handled by the facility;

- Material routing through each stage of its handling within the facility will be documented utilizing a centralized data acquisition and control system and make provision for the quarantine of materials prior to confirmation analysis, segregated handling, storage and treatment of incompatible materials, disposition of treatment by-products and publicly accessible reporting;

- Provision will be made for the retention of solid treatment residues on-site in secure, monitored cells, the operation of which shall be housed and restricted to the receipt of stabilized solid material that has undergone testing to verify the effectiveness of the treatment and stabilization processes applied;

- The overall facility design shall incorporate environmental monitoring of indoor air, ambient air, surface water and ground water quality, and be amenable to independent operation and oversight;

- Emergency response capability will be provided to respond to any upset events that could occur on the facility site, and off-site as material is being transported between the waste generator and the central facility; and,

- The design should provide for ease of public access in recognition of an open policy respecting facility operation and its monitoring.

4.2.3 Description of Facility Components

The following provides a more detailed description of the scope and operation of the various facility components and operating systems listed in Section 4.2.1.

a) Administration Building

The administration building will accommodate both professional and administrative staff required to support the facility's operation and potentially, the overall operations of the system's operator. Typical operations include accounting, purchasing, engineering, data management services, personnel and clerical support. In addition the building will provide an entry point for public access to the facility with meeting, presentation and records access areas being provided. A guardhouse and weigh scale will be situated directly adjacent to the building to control plant access.

b) Main Operations Building

This is a 6600 m^2 building housing all receiving, segregated storage, treatment and by-product management operations, along with supporting utilities, analytical capability, control systems and operating personnel support infrastructure. Figures 4.4 (a) and (b) provide the general layout of the building on both the main floor and mezzanine levels respectively. Figure 4.5 depicts a model of the building.

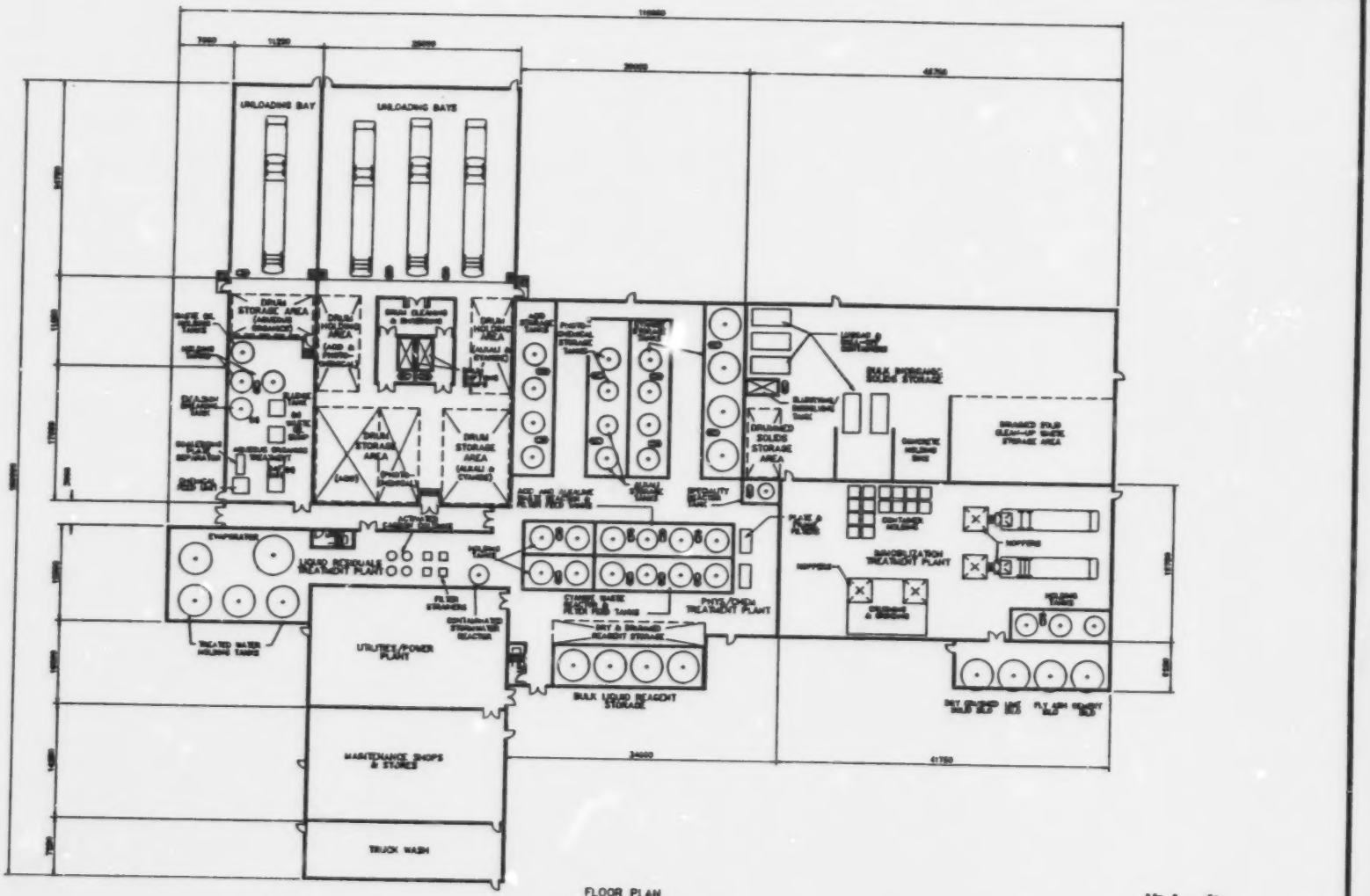
The inclusion of all operations in a single building reflects the winterization imperative associated with the design and desire to minimize potential environmental exposure in areas where sensitive operations are conducted. Overall features to be incorporated into this building include general accessibility for the viewing of all operations, flexibility to expand operational activities, positive management of indoor air quality and a high standard of fire protection. Each operational area is described below.

i) Materials Receiving

After clearing the gate house, vehicles will be directed for shipment verification and unloading in a covered area of the building. Provision is made for unloading shipments received in drums, as bulk liquids and as bulk solids. Verification sampling of shipments will be undertaken in association with the unloading operation. A range of commercial truck configurations will be provided for, including semi-trailer vans typically carrying 80 drum loads, bulk liquid tankers up to a capacity of 20 tonnes, and covered bulk solid carriers.

The materials handling capability provided includes:

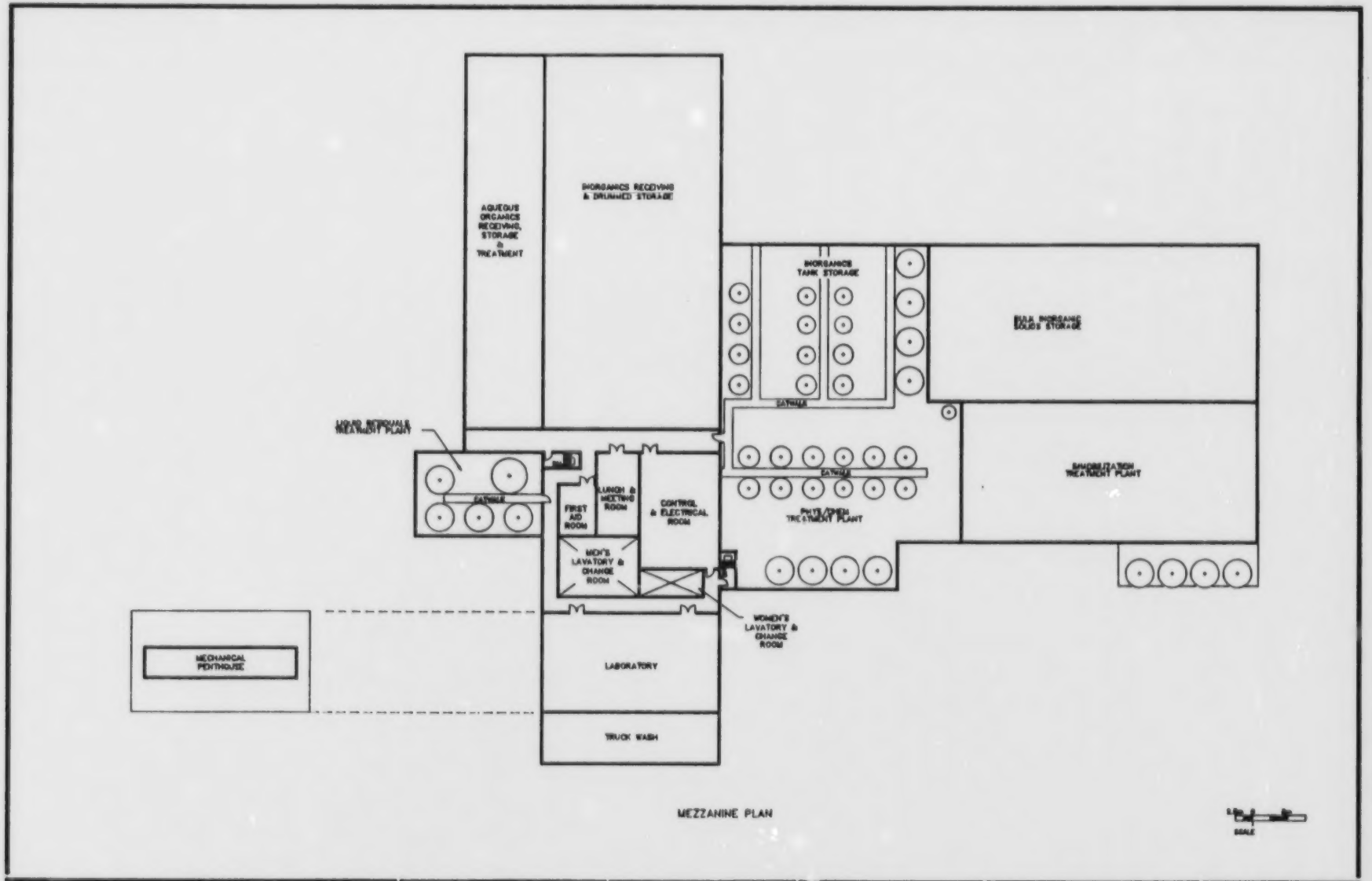
- Separate unloading stations for major waste types, such as acids, alkalis and cyanides, and aqueous organics, received in both drummed and bulk forms;
- Materials sampling capability;
- Individual drum movements utilizing motorized hand-guided dollies, as well as palletized drum movements utilizing fork lift vehicles;
- Drum dumping and pumping facilities, complete with a capability to collect fugitive emissions and direct them to an appropriate emission control system;
- Facilities for slurrying/dissolving solids dumped directly from drums and bulk containers;
- Internal washing capability for bulk vehicles;
- Size reduction and slurrying facility to handle solid wastes that require slurrying prior to processing;
- A drum washing station to decontaminate drums for reuse or disposal as scrap; and,
- A drum crusher/shredder station.



FLOOR PLAN

SCALE

			Manitoba Hazardous Waste Management Corporation	Reid Crowther	Facility Design Specification and Technology Characterization	designed D.J.T.	date 88-12-02
						drawn P.A.L.	project no. 61280
					MAIN OPERATIONS BUILDING LAYOUT MAIN FLOOR	checked A.W.H.	drawing no./figure 4.4a
						approved	rev.



MEZZANINE PLAN

SCALE

ManRobe Hazardous Waste Management Corporation

Gold Crowther & Partners Ltd.

project: Facility Design Specification and Technology Characterization

MAIN OPERATIONS BUILDING LAYOUT
MEZZANINE LEVEL

designed: S.A.T.
drawn: P.A.L.
checked: A.W.M.
approved:
date: 90-12-03
project no.: 01280
drawing no./figure: 4.4b
rev.:

MANITOBA HAZARDOUS WASTE MANAGEMENT CORPORATION

Processing Building

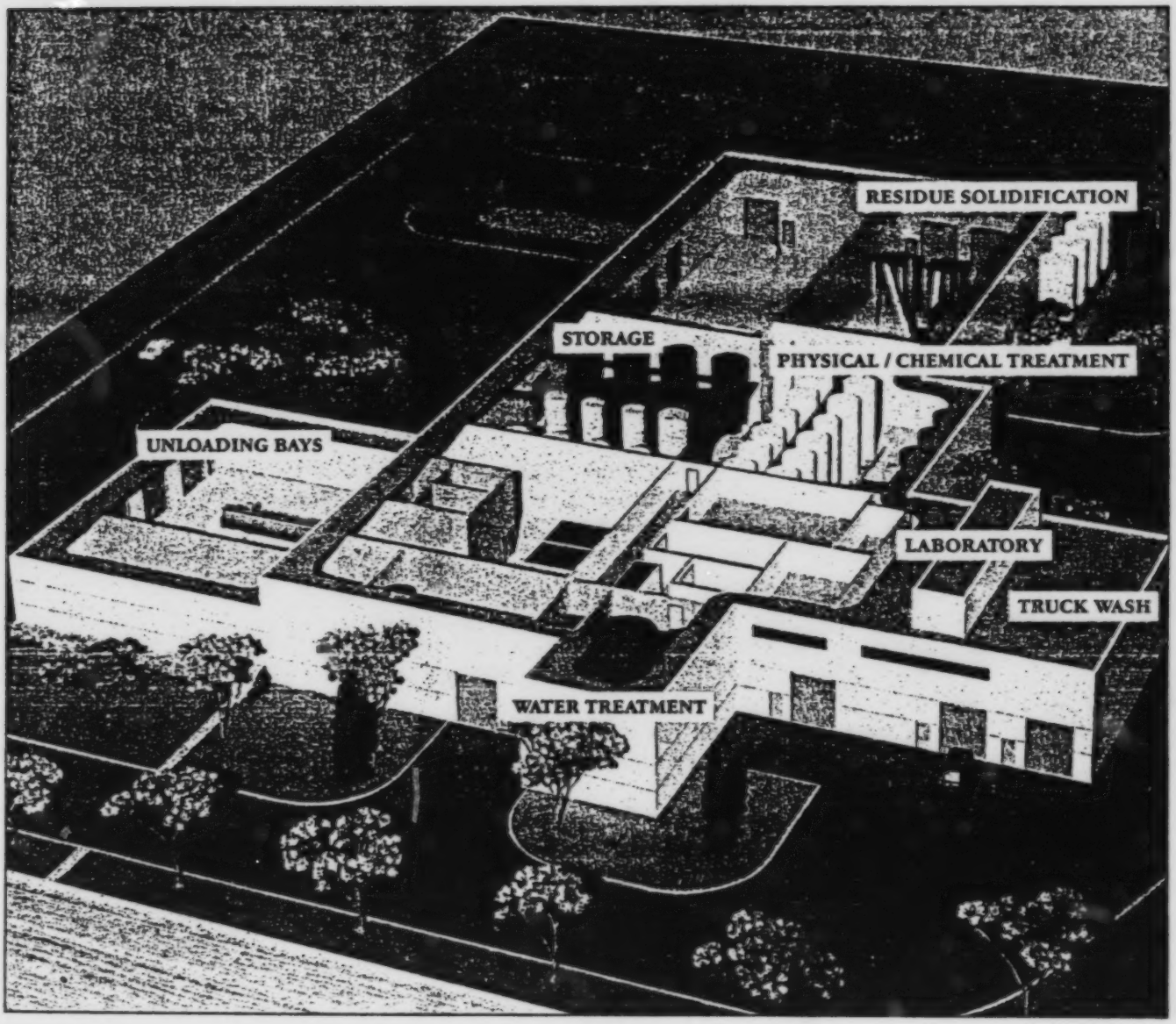


Figure 4.5

ii) Materials Storage

The storage area for incoming waste is immediately adjacent to the receiving area and provides the following features:

- Curbed and segregated storage areas for drummed acids, alkalis, cyanides and aqueous organics;
- Cylindrical bulk storage tanks for acids, alkalis, and cyanides, mounted with the longitudinal axis in the vertical direction, constructed with a conical bottom, and provided with a variable mixer;
- Storage capacity for all bulk liquid inorganic wastes intended for on-site physical/chemical treatment, equivalent to ten operating days such that it provides:
  - Two days storage reserve for incoming wastes;
  - Two days inventory to allow for treatability testing in a laboratory;
  - Three days inventory for blending (if desired); and,
  - Three days allowance for tanks which are partially filled due to smaller batches requiring segregation.
- Nominal capacities of $20m^3$ and $40m^3$ for bulk liquid inorganic storage tanks;
- Venting under slightly negative pressure to a gas scrubbing system for all bulk liquid inorganic storage tanks;
- An inert gas blanket and venting to a gas scrubbing system for all bulk liquid organic waste storage tanks; and,
- Dyking of all bulk storage tanks with sufficient capacity to contain a volume at least equal to 110% of the capacity of the largest tank enclosed by the dyke.

iii) Inorganic Physical/Chemical Treatment

The inorganic waste physical/chemical treatment facility will be comprised of the following:

- Treatment trains consisting of vessels, transfer piping, pumping systems and controls providing batch capability for the following process operations:
  - Neutralization;
  - Precipitation;
  - Cyanide destruction;
  - Oxidation/reduction;
  - Photochemical waste oxidation; and,
  - Solids separation.
- Reactor vessels which will be cylindrical in shape, mounted with longitudinal axes in a vertical direction, fully enclosed, constructed with a conical bottom, and provided with a mixer;
- All reactor vessels will be vented under slightly negative pressure to an emission control device and provided with externally applied cooling capability;
- Materials of construction for reactor vessels could typically be rubber lined carbon steel. Alternative materials and linings will be considered during detailed reactor design, to provide the optimum in flexibility;
- Sensing and recording devices on the reactors for temperature, pH, oxidation/reduction potential and other appropriate parameters of the contents;
- Sensing and recording devices for critical reaction gases in the atmosphere above the liquid surface in each reactor;
- Bulk reagent storage tanks which will typically contain caustic, sulfuric acid, and sodium hypochlorite;
- Bulk reagent storage tanks which will be maintained under slightly negative pressure and vented to a scrubbing system; and,
- Solids separation capability to employ flocculants, coagulants, and a plate and frame filter press.

The process flow diagram for the physical/chemical treatment of inorganic wastes is illustrated in Figure 4.6. All treatment will be done on a batch basis, according to recipes determined by laboratory analysis. Two basic treatment trains are involved. One will treat acids, alkalis and photochemical wastes, whereas the other will be dedicated to cyanide destruction. Each train will consist of the following:

- Two reaction vessels outfitted with a variety of reagent feed systems for neutralization, metal precipitation, reduction and oxidation;

- Two filter feed vessels into which the reactor contents can be transferred to await filtration. Each vessel will be provided with additional reagent feed systems and mixers to promote solids coagulation and flocculation;

- One plate and frame filter press; and,

- Two filtrate holding tanks to receive filtrate and provide for sampling and analysis to verify the effectiveness of the treatment process as well as return capability to the reactors for reprocessing if required.

The four reactor vessels will be fitted with a heating/cooling system. This will provide the capability to withdraw excess heat of reaction, or to add heat to the reactors in order to increase the rate of a slow reaction.

A single smaller specialty reactor is provided to handle smaller quantities of wastes that might be very concentrated, or may require processing steps different than those used for treating the majority of the materials.

Residuals from the inorganic physical/chemical treatment process include filtrate water, which will be treated in the liquids residual plant, or used in the immobilization process, and filter cake, which will be directed to the immobilization plant.

The various processes as applied to specific types of materials are described in more detail in the following discussion.

- Acid and Alkali Neutralization

  Acid or alkaline solutions requiring neutralization may be mixed together in a reactor to achieve neutralization. Additional acid or caustic is added, if necessary, until the desired pH is achieved.

Metals are precipitated as hydroxides by adding caustic to raise the pH to between 9 and 11, with the optimum pH for precipitation dependent on the metals being removed. A sulfide compound may also be added to achieve additional precipitation. When metals have been precipitated, the reactor contents are pumped to the filter feed tanks for solids conditioning.

- Cyanide Destruction

The cyanide solution batches are pH adjusted to an alkaline range of 10.5 to 11.5 through the addition of caustic. Cyanide is first oxidized to cyanate by adding sodium hypochlorite, with the reaction monitored by an ORP (oxidation-reduction potential) meter. Caustic is reintroduced, if necessary, to maintain a relatively constant pH of between 10.5 and 11.5. After the end point has been reached, the reaction can be confirmed using potassium iodide starch test paper for excess chlorine.

The cyanate is then oxidized to nitrogen and carbon dioxide by adding additional sodium hypochlorite. This second oxidation reaction proceeds most rapidly at a pH between 8 and 9. ORP is again monitored to determine the proper reaction end point. If dissolved organics are present, they are oxidized by the addition of hydrogen peroxide. Dissolved metals are precipitated as hydroxides by adding caustic.

Prior to discharge, the reactor contents are sampled and analyzed for cyanides and other dissolved metals and organics. Provided the reaction is complete, the reactor contents are pumped to the filter feed tanks for solids conditioning.

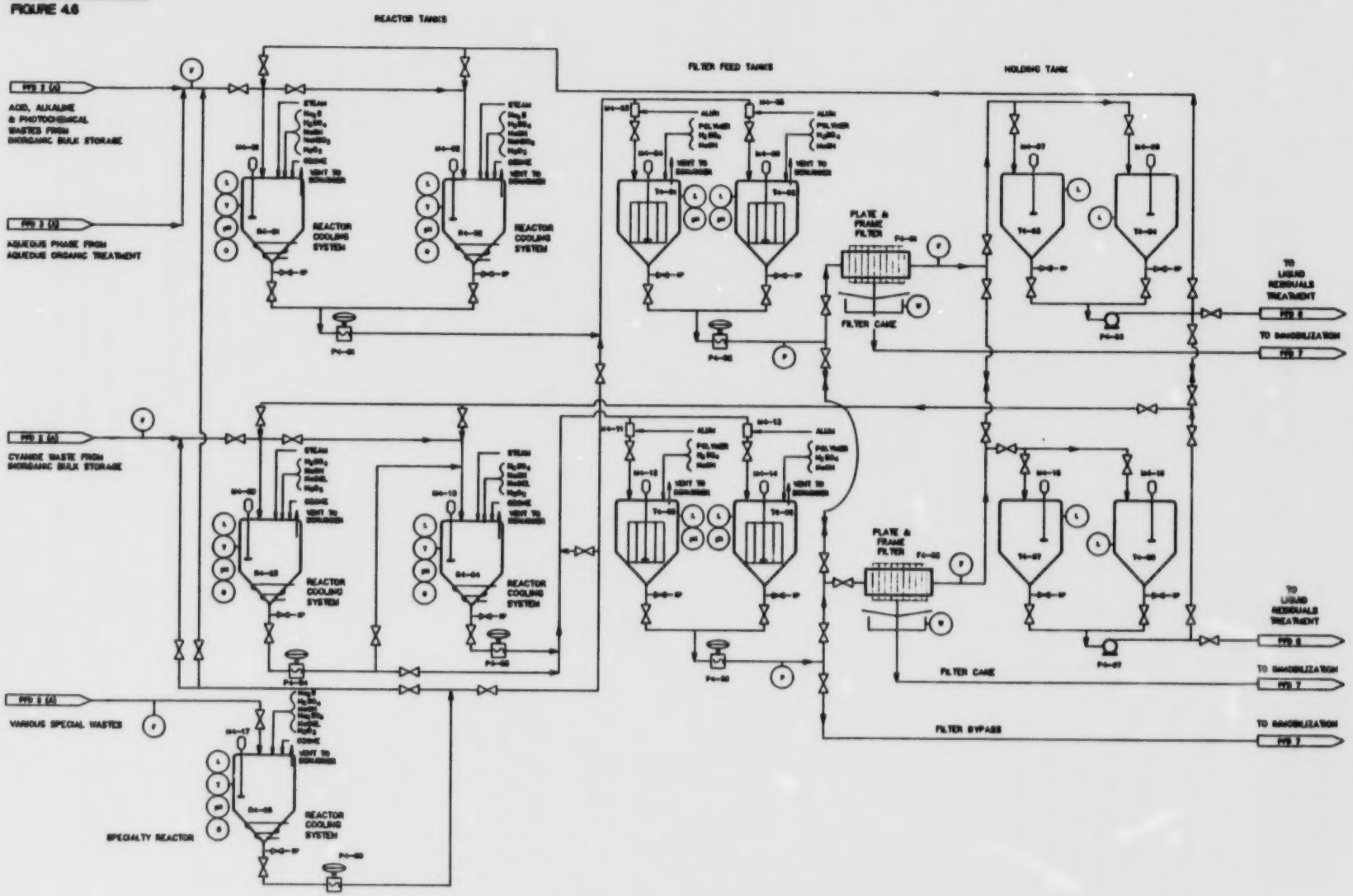
- Chromium Reduction

For Chromium solutions with a pH that is alkaline, acid is added to adjust the pH to less than 2.5. A sodium metabisulfite solution is fed into the reactor tank to reduce hexavalent chromium to trivalent chromium. The oxidation-reduction potential is monitored to control the chemical feed rate. Once the desired ORP has been achieved, the reaction is confirmed by using a hexavalent chrome indicator reagent (diphenyl carbacid).

The reduced chromium waste is neutralized using caustic to a pH of 8 to 9, causing the chrome and other metals to precipitate as hydroxides. A sulfide compound may also be added to achieve additional precipitation of metals. If dissolved organics are present, they are oxidized by the addition of hydrogen peroxide.

Process Flow Diagram
Inorganic Treatment

FIGURE 4.6



Before discharge, the reactor contents are sampled and analyzed for dissolved metals and organics. The reactor contents are then pumped to the filter feed tanks for solids conditioning.

- Solids Separation

Solids are separated from the waste stream through a series of physically and chemically based operations. As the waste materials enter the filter feed tank, coagulant (alum) and flocculant (polymer) may be added in a flash mix chamber to assist the metal precipitates in forming settleable flocs. The retention time in the filter feed tank is dependent on the time required to form settleable solids, and on the availability of the filter press.

The waste will then be pumped from the bottom of the filter feed tanks to one of the two plate and frame filter presses. The precipitated solids will form a sludge cake in the chambers of the filter press. The more dilute filter feed will be pumped through this filter cake near the end of each filter batch. The pressure drop across the filter is continuously monitored. Once the pressure reaches a pre-determined value, the filter cake is removed. The cake falls by gravity into special containers, which will then be transported to the immobilization area.

The clarified filtrate will flow to one of four holding tanks. The holding tank contents will be sampled and analyzed for dissolved metals and trace organics. If the contents meet acceptable treatment criteria, they will be pumped to the liquid residuals treatment facility; if not, they will be returned to one of the reactors for further treatment.

iv) Organic Physical/Chemical Treatment Plant

This plant provides a capability to pretreat aqueous organic and mixed waste such as cutting and cooling oils. It is situated separately from the other treatment trains since the materials involved are potentially flammable and require specific fire protection and containment. This plant consists of the following components:

- Segregated bulk storage for aqueous organic material on receipt;
- A heated emulsion breaking and decanting tank, designed for batch operation;
- A coalescing plate separator (CPS) and a dissolved air flotation unit (DAF) operated semi-continuously;

- Collection and transfer capability of organic residues for treatment at other facilities; and,

- Transfer capability of produced water and residual inorganic solutions for treatment within the facility.

Figure 4.7 provides a process flow diagram for this operation and it is described for a typical waste stream below.

Waste materials are pumped from the waste storage tanks to the emulsion breaking tank. The tank is heated and acid is added to break up oil-water emulsions and render the oil separable. Waste will typically be held in this tank for 12 to 24 hours, allowing for gravity separation of oils.

The tank can be emptied in a number of ways. The oil layer can be drained off by opening one of the several valves provided at various heights on the tank. The oil would flow by gravity to a residual hydrocarbon sump. The remaining liquid could then be pumped, at a controlled rate, through the CPS. Alternately, the entire contents of the tank could be pumped through the CPS, at a controlled rate.

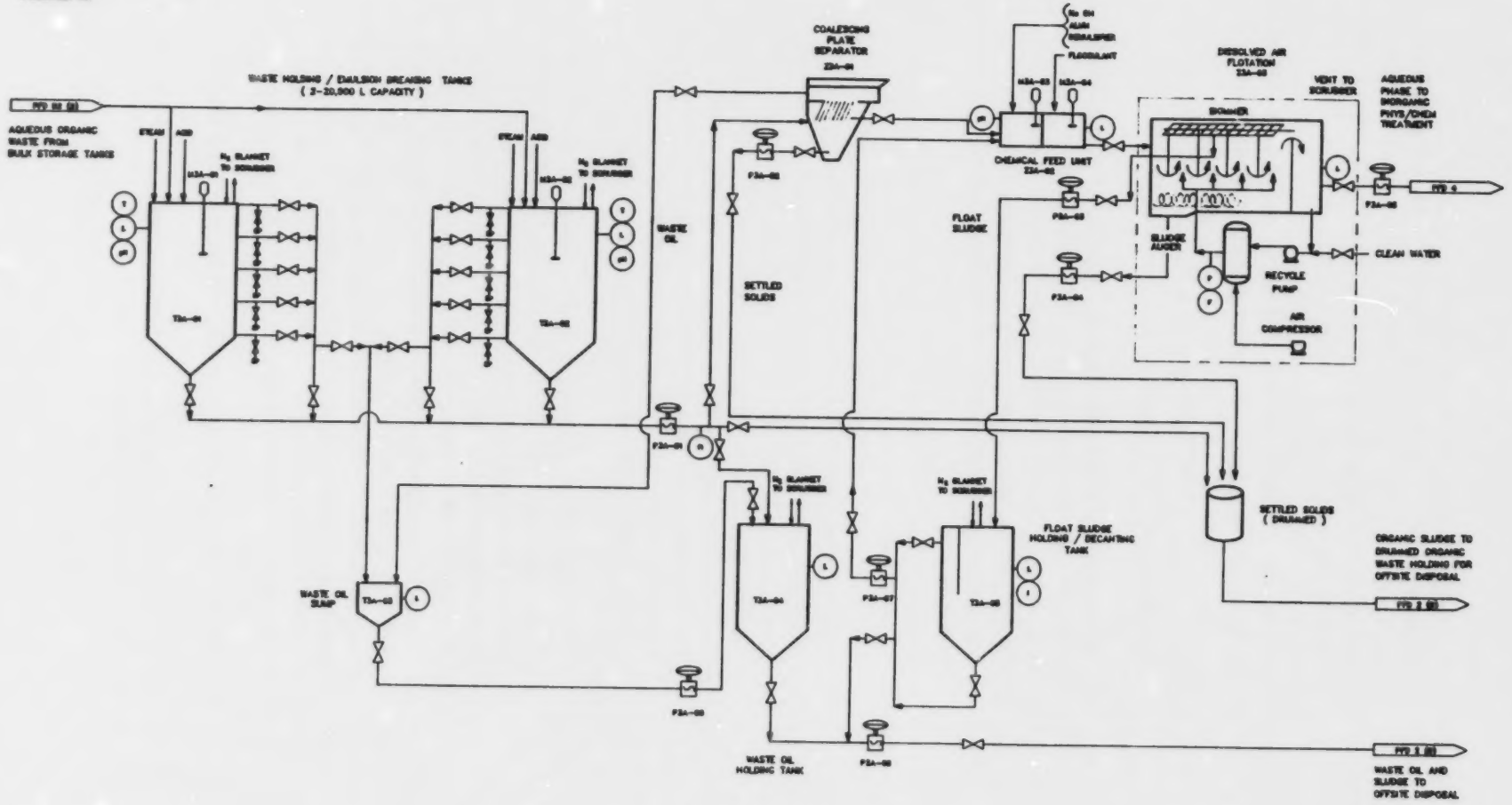
In the CPS, solids settle to the bottom and separable organic liquids float to the surface. This material continuously overflows a weir and flows by gravity to the organic residuals collection sumps. Clear water overflows a second weir and flows by gravity to the Chemical Feed Unit (CFU). Settled solids are intermittently pumped out and drummed. The drums are stored in the aqueous organics drum holding area. Organic residuals are periodically pumped from the sump to a holding tank, located in this process area.

The water overflowing from the CPS may still contain emulsified oils. Further emulsion-breaking reagents are added in the CFU upstream of the DAF process. The reagents are added to the rapid mixing chamber of the CFU. The liquid then flows to the flocculation chamber of the CFU, where gentle mixing encourages the coalescence of oil droplets, and the formation of floatable flocs.

The flocculated mixture flows by gravity into the DAF tank, where the liquid passes through four baffled cells in which micron size, pre-dissolved air bubbles float the floc to the liquid surface. The floated oil and floc are skimmed off continuously, and pumped to the float sludge holding tank. Any solids that settle in the DAF will be pumped out intermittently, and drummed.

Process Flow Diagram
Aqueous Organic Treatment

FIGURE 4.7



Fugitive emission control in this area will be addressed through the incorporation of nitrogen blanketing for the storage vessels, while the DAF and Chemical Feed Tank will be equipped with fume hoods vented to a scrubber system.

The treated effluent overflows into a clear well, and is pumped to a holding tank in the inorganic physical/chemical treatment area. The sludge is further concentrated in the float sludge holding tank. Thickened sludge is pumped to a sludge holding tank for ultimate off-site disposal. The liquid residuals are recycled through the treatment process.

Residual streams from the process include hydrocarbons, float sludge from the DAF unit, and a sludge containing oily solids and grit. These materials will be shipped off-site for further treatment and disposal. The aqueous phase that is separated from the organic phase will be directed to the inorganic physical/chemical treatment facility for metals removal as required.

v) Immobilization Plant

This plant is intended to immobilize solid treatment residues from the physical/chemical treatment processes and solid industrial wastes (non-hazardous) that are unsuitable for conventional landfilling. The process involves the application of pozzolanic technology to immobilize residual contaminants, particularly metals, in a relatively impervious matrix. The matrix material will be a combination of such materials as portland cement, fly ash, lime and silicates that is applied on a customized basis for various residues in an operation similar to mixing concrete.

The immobilized residues will be tested for compliance with current regulatory standards (leachate test). The solidified samples are crushed, leached and analyzed for regulated contaminants. The current standard test applicable is the U.S. EPA Toxicity Test (EP TOX). However, leachate testing procedures are currently being updated in accordance with the development of new extraction procedures being researched by Canadian environmental agencies (CEP - Canadian Extraction Procedure). It is expected that this test will be adopted as a standard for the facility subject to its general adoption as a regulatory standard.

The principal features of this plant are as follows:

- Adjacent storage for different reagent matrix materials;
- Particle size reduction facility to reduce the size of the larger solids fed to the system;

- Blending installation to effectively mix reagent matrix material with the solid residue material;
- Batch holding area to allow curing and testing for structural integrity and leachability, prior to placement in the repository;
- Computerized data management and materials tracking system to monitor treatment protocols, along with handling and testing of the product; and,
- Control of fugitive particulate emissions in the area.

vi) Liquid Residuals (Water) Treatment Plant

Liquid residuals treatment comprises two trains. One is for treating contaminated stormwater, while the other is for aqueous residuals from the inorganic physical/chemical treatment facility.

The stormwater treatment train consists of the following:

- Stormwater holding system;
- Reactor for pH adjustment, treatment of metals and oxidation of organics;
- Micron filtration in a duplex strainer/filter system for particulate removal;
- Activated carbon adsorption for organics removal;
- Treated stormwater holding tanks for verifying contaminant levels prior to release; and,
- Discharge to surface watercourse or irrigation system.

The process water treatment train consists of all of the above, with the exception of the reactor. The pH adjustment is done via chemical addition to an in-line mixer. An evaporator and condenser are also provided to produce a low dissolved solids (distilled) liquid stream, suitable for discharge to the environment, in compliance with the facility's operating order.

vii) Laboratory

This area, located on the mezzanine level of the plant, will provide an analytical capability suitable to characterize incoming materials, specify treatment regimes, conduct process and plant output testing, and support environmental monitoring activities. In particular, the laboratory will provide the capability to perform the following:

- Characterization, costing and qualification of prospective waste shipments from waste generators;
- Screening analyses to verify the contents of incoming waste shipments prior to acceptance;
- Treatability testing to formulate processing recipes for specific waste batches;
- Process control monitoring to verify treatment performance;
- Detailed analysis of treated residues prior to release to the environment or placement in a repository;
- Detailed analysis of samples collected from the environmental monitoring system; and,
- Workplace monitoring.

The last two items mentioned in the above are activities which could potentially be contracted to an independent laboratory.

While the overall scope of the laboratory operation has not been fully defined, the facility will incorporate as a minimum the following capabilities and features:

- Sample, reagent and laboratory supplies receiving;
- Sample storage;
- Treatability testing (including leachate tests);
- Wet chemistry laboratory;
- Metals laboratory;
- Organics laboratory;
- Standards preparation room;

- Reagent and laboratory supplies storage;
- Gas cylinder receiving and storage;
- Laboratory personnel safety/protection facilities;
- Laboratory waste disposal facilities; and,
- Offices and work stations.

Special heating, ventilation and air conditioning (HVAC) requirements for very clean air in the instrumentation area dictate that the supply to these areas be filtered and under slightly positive pressure with respect to the rest of the laboratory. If final design confirms that the laboratory will be located in the central processing building, the entire laboratory area should be under slightly positive pressure with respect to the rest of the building to avoid possible migration of dust and fumes from the plant.

The laboratory operation will be governed by a certified quality assurance/quality control program. The applicable standard is anticipated to be that currently under development as a national standard by Canadian Standards Association.

viii) Operating Plant Support Infrastructure

The following general support infrastructure will be contained in the main operation building:

- Utility services including:
  - Steam generation and/or glycol heating system;
  - Hot water;
  - Compressed air;
  - Instrument air;
  - Electrical substation;
  - Water supply; and,
  - Sanitary waste disposal.
- Equipment maintenance and stores;
- External truck washing capability;
- Personnel training and lunchroom area;
- Personnel wash-up/restroom areas including working clothes change area segregated from the street clothes change area by a mandatory shower/wash-up facility;

- Sick bay and medical room;
- In-plant emergency response equipment for first aid, spill cleanup, and fire fighting; and,
- Public access facilities in the form of walkways and viewing points for all operations.

c) Solid Treatment Residue Repository

The philosophy undertaken in the development of a secure containment capability for the treated solid residues is based on the following:

- All hazardous wastes will be treated to the extent that their potential to adversely affect the environment is minimized, prior to the residuals being immobilized;
- All solid residues from treatment processes will be immobilized in a solid matrix;
- All batches of immobilized residues will be subject to leachate testing, verifying their long-term stability;
- The repository will incorporate liners and leachate detection and collection systems to provide several levels of environmental protection;
- The repository will be covered by a portable building during its active life to keep liquids (precipitation) out of the cell;
- Upon closure, the cell will be capped with a liner system to minimize the potential for infiltration of surface water; and,
- Each cell will be equipped with a monitoring capability to ensure that the cell's long term integrity as a barrier to potential environmental contamination is assured.

A number of design configuration options exist for the repository, ranging from shallow entombment to above-ground cells. It is proposed that either the above-ground, or in-ground configurations equipped with synthetic liner systems and leachate detection and collection capability be adopted. These are illustrated in Figure 4.8. The determination as to which type of design is ultimately chosen will be dependent upon site specific hydrogeological conditions such that the optimum containment and monitoring capability is achieved and the views of candidate host communities can be incorporated into the decision. In the following, each option is discussed in terms of the various technical factors that may be involved in their evaluation.

Above-ground placement involves the development of the cell directly on the surface such that the cell is developed as a mound to a finished height of approximately 6 metres. The synthetic liner system is placed at grade at the base of the cell and extended around the cap upon closure. This configuration offers the ability of the leachate collection system to drain continuously and freely under gravity, thus minimizing contact time of the leachate with the liner system. The performance of the repository can be continuously monitored, and leachate discharge, if any, can be better traced to various locations within the repository. In this way it provides potential for more immediate and efficient monitoring and detection of failures in the liners or immobilization process performance. Finally, it offers easier maintenance of leachate collection and monitoring systems and corrective measures can be more readily implemented with all elements of the system being above-ground. However, the design must accommodate local climatic conditions and a recognition that the leachate collection system would be inoperative during the winter months. It also presents a greater surface area exposed to precipitation and potential water infiltration, has greater visual impact and may present more difficulty for bulk placement operations.

The in-ground concept involves placement of immobilized residues in an excavated cell, approximately 6 metres in depth. It would incorporate liners and a leachate detection and collection system. The major difference from the above ground configuration is that the leachate collection system is not passive and would require the leachate to be pumped from a sump. In addition, it would be more difficult to effect repairs to the liner system, should they be required. On the other hand, the below ground configuration can offer greater ease of placement, is more easily housed during operation and has minimal visual impact.

The overall sizing of each cell has not been finalized; however, the conceptual design work to date suggests a capacity of 15,000 tonnes per cell which would occupy an area of 2,500 m^2. This would be approximately equal to one year of residue production, based on current design capacity.

Whichever system is ultimately chosen, the landfill design will focus on preventing moisture from entering the cells through the top, sides and base, thereby minimizing the potential for the generation of leachate, and preventing possible migration of residual contaminants from within the cell.

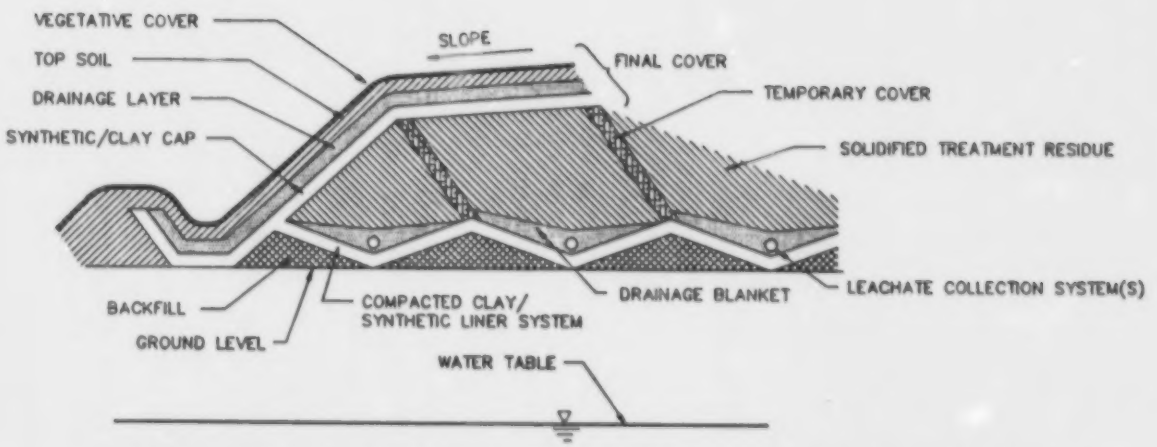
d) Site Control, Protection and Monitoring Systems

i) Surface Water Collection and Segregation System

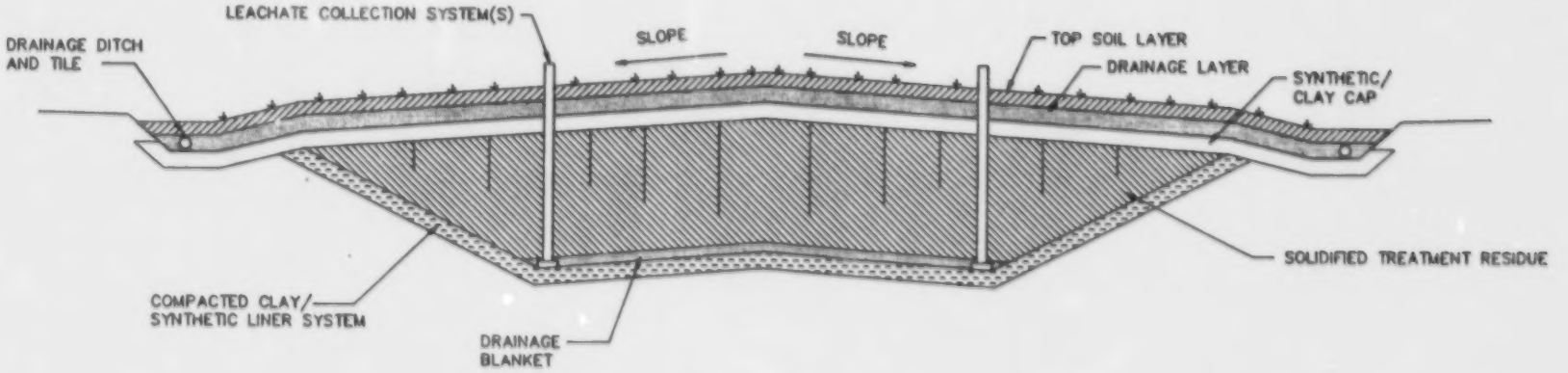
Stormwater which accumulates on the active areas of the site will be collected, either by gravity drain to the stormwater retention ponds, or via a piped collection network. Areas considered to be susceptible to potential contamination include all areas of vehicular traffic which are paved and curbed to allow separate collection of stormwater, as well as building roofs in the area of scrubber and ventilation outlets.

Residue Repository Design Options

Figure 4.8



CROSS-SECTION THROUGH A TYPICAL ABOVE GROUND REPOSITORY



CROSS-SECTION THROUGH A TYPICAL IN-GROUND REPOSITORY

Retention ponds for stormwater collection systems will be sized and designed in accordance with local precipitation factors and be equipped with synthetic liners to prevent migration of potential contaminants into the environment.

The water in the ponds will be sampled and analyzed, on a regular basis, as required. In the presence of trace contamination, the stormwater will be routed through the facility's liquid residuals treatment plant. Uncontaminated water will either be reused within the plant, or discharged to the environment, with options being to a surface watercourse, or as irrigation water to the facility grounds or an adjacent parcel of land.

ii) Environmental Monitoring Systems

The facility will incorporate a comprehensive environmental monitoring system to facilitate early detection of, and response to, any process upset or environmental release. The principal components of this system are described below.

- Process Control Monitoring

  Prior to any material undergoing treatment, sample analyses and compatibility and treatability test information will be used to establish appropriate treatment recipes. Further to this, in-process testing will be performed by the laboratory to ensure that treatment is proceeding as planned. This applies to both physical and chemical treatment processes, as well as residues undergoing immobilization. Samples of leachate from the repository cells, should any be generated, will be analyzed to confirm the integrity of the immobilized material.

  In addition, performance and process monitoring and sampling will confirm that emission controls are functioning according to predetermined standards.

- Emission Monitoring

  An emission monitoring capability will address potential emission sources, including atmospheric emissions and those from surface water sources.

Atmospheric emissions will consist mainly of extremely low concentrations of volatile organic compounds and acid gases, released during normal operation from vent emission control equipment. Aqueous discharges will consist of runoff stormwater, and treated liquid residuals from the evaporation and condensation process which have been analyzed and proven to be uncontaminated. Solid emissions will be minute particles of salts and metals, transported with gaseous emissions or air as fugitive emissions.

- Ambient Environmental Monitoring

This capability will provide for the regular monitoring of air quality, surface and ground water, soils and biological indicators. A permanent meteorological station will be established, and groundwater monitoring wells will be established within the facility perimeter, as well as beyond. The groundwater monitoring program will focus on the repository cells. Off-site biological indicators identified on a site specific basis will be monitored on a periodic basis in the surrounding area. For example, this would likely include crops and livestock, should the site be located in an agricultural area.

Final plans with respect to ambient monitoring will be developed on a site specific basis in accordance with regulatory requirements and public consultation.

- Occupational Health and Safety Monitoring

The assurance of protection for workers and community safety and health are major priorities during facility operations and will be addressed proactively through a monitoring program as well as facility design and operating procedures. With respect to the latter, safety procedures will be established based on an analysis of potential hazards, and personnel protection measures will be selected in response to these risks. This will include provision of accessible safety equipment such as first aid kits, eye wash stations, showers, fire extinguishers and respirators.

Pre-employment, as well as periodic screening medical examinations will be mandatory for site personnel.

iii) Emergency Response Capability

An emergency response plan will be developed to handle any emergencies which may arise at the facility in the course of operations, using on-site resources, and potentially off-site assistance. Ongoing communication with local fire departments and medical agencies will ensure the integrity and effectiveness of the program.

Objectives of the emergency response plan will be as follows:

- Appraise the situation and implement immediate action to stop, contain or minimize the release of contaminants arising from incidents both on-site and off-site;
- Provide the capability to minimize the impact of an incident with respect to both facility personnel and the local community;
- Contain and minimize damage to the environment, as well as ensure the integrity of facility equipment; and,
- Provide and maintain an effective emergency response program capable of responding to an incident on-site, and coordinating with local agencies in dealing with an occurrence not related to facility operations.

The above will be accomplished through the development of detailed emergency response procedures, which will be derived through an evaluation of potential hazardous situations, and their associated mitigative responses. As a minimum, this will include the provision of on-site fire fighting and spill clean up capability, notification protocols for community action and access to outside emergency resources and personnel training.

iv) Data Management System

The data management system will provide an integrated information handling capability for the efficient planning, coordination and management of facility operations. These operations will include the following:

- Materials flow - reception, handling and storage;
- Data flow - acquisition, processing and storage;
- Coordination and planning of individual processes, operations and administrative functions;
- Maintenance of a common database to serve all users;

- Generation of reports; and,

- Immediate retrieval of required information.

This system will provide an audit trail to ensure that operating, regulatory and safety procedures are being followed.

v) Process Control

Process control comprises control and monitoring for the waste treatment process areas, common site services and facilities, as well as safety systems. The process control system will carry out these functions, and provide an interface between the process operators and the plant equipment. Control functions will be carried out from one control room located within the process building. Local control will be provided as deemed appropriate during the detailed design stage.

vi) Fire Detection and Protection

The fire detection system will ensure the safety of personnel, and the integrity of the facility components, through the continual monitoring of equipment and buildings to provide early warning of a potential occurrence. The alarm and detection system will consist of a centrally located monitoring station, combined with strategically located detection devices throughout the facility. The system will have the capability of raising an alarm and indicating trouble status and fire location. The overall system will be finalized during the detailed design phase of the project.

The fire protection system will provide the facility with the capability of minimizing and controlling the consequences of a fire. The following provides a brief description of the various systems that will be incorporated into the facility design, to be further evaluated through detailed design, and with respect to risk management recommendations:

- The firewater system will incorporate a dedicated supply of firewater, capable of meeting the requirements of a major incident and operable under all climate conditions. The exterior system will comprise hydrants and monitors, whereas the fire protection systems located within the buildings will consist of standpipes and hose cabinets, and sprinkler and deluge systems. The main firewater pump will be 100% spared, with the spare provided with an alternative source of power;

- In addition to the firewater system, a foam fire suppression system to handle fires of a chemical nature will be provided. The exact nature of this system will be addressed at the detailed design stage;

- In the process control room, as well as the laboratory instrument room, where water could do extensive damage to equipment, a pre-action sprinkler system may be implemented. The exact nature of the system will be addressed at the detailed design stage; and,

- Portable fire extinguishers will be located, as required, throughout the entire facility.

In addition to the above, a number of measures will be incorporated into facility design to minimize the potential of an incident. Some of these measures include:

- Planned access for fire fighting purposes;

- Incorporation of appropriate materials of construction for buildings and structures within the facility;

- The provision of fire separation walls between adjacent areas to ensure appropriate protection;

- The design of electrical distribution systems to the appropriate classification for the service; and,

- Ventilation and inert gas blanketing systems to reduce hazard potential.

vii) Safety and Security

Safety and security systems, in addition to those mentioned above, will be incorporated into the facility design to prevent on-site accidents, and to prevent unauthorized access to the facility. To achieve this objective, the following will be implemented:

- Engineered containment systems will minimize the potential for the release of contaminants to the environment, such that total reliance is not placed on the natural containment features of the site;

- Workplace hazard designations will specify requirements for specific safety and personnel protection equipment, including clothing, gloves, footwear, safety hats, eye/face protection and hearing protection;

- Safety showers and eyebaths will be located in areas where the handling of acutely hazardous chemicals is anticipated;

- Portable respirators will be available where there exists the potential for a release of potentially hazardous gases from an upset condition, and will be required to be worn when direct handling of materials having the potential for their release is occurring; and,

- An appropriate level of site security will be provided, including perimeter fencing, 24 hour monitoring and access control, and restricted access to control rooms and data management systems.

viii) Emission Controls

While included with the above descriptions of the various facility components, Table 4.2 provides a summary of the various emission controls incorporated into the facility.

4.3 STORAGE/TRANSFER FACILITY

4.3.1 Facility Overview and General Operation

In this section, the storage/transfer facility is described as developed in or near Winnipeg and independently of the central treatment facility (Section 4.2). The overall function of this facility is to act as a secure receiving, accumulation, bulking and potentially, a pretreatment operation for wastes collected by the system, and to allow efficient transfer of this material to competent treatment and disposal facilities elsewhere. It is designed to offer the following specific capabilities:

- Storage and blending of liquid organic material suitable for resource recovery management options such as recycling, direct reuse as a raw material, or use as industrial fuel;

- Storage, bulking and reshipment of organic materials requiring thermal treatment (incineration) and disposal at facilities located outside the province;

- Storage and bulking for small quantities of locally generated inorganic and aqueous organic wastes prior to shipment to the central treatment facility;

- Sorting, packaging and bulking of small quantity waste streams such as household hazardous waste; and,

- Secure central storage of PCB contaminated material accumulated as equipment containing it is removed from service and until such time as treatment and disposal capability for it becomes available.

TABLE 4.2
SUMMARY OF
EMISSION CONTROL MEASURES
CENTRAL TREATMENT FACILITY

Component	Facilities	Objective	Pollution Control Measures
Waste Reception	Sampling	Fugitive Control	Specialized Sampling Protocol
	Laboratory	Fugitive Control	Fume Hoods and Specialized Sampling Protocol
Waste Storage	Drum Decanting and Shredding	Fugitive Control	Isolated Area Vented Through Caustic Scrubber
		Spill Prevention	Diked and Sealed Floor and Sumps
	Bulk Storage	Fugitive Control	Inert Gas Blanket Vented to Scrubbers
		Spill Control	Diked Area, Sealed Floor and Sumps, Liquid Level Alarms
	Drum Storage	Spill Control	Diked Area, Sealed Floor and Sumps
		Leakage Control	Routine Inspection and Repackaging
	Solids Storage	Fugitive Control	Indoor Storage in Covered Bins
Phys/Chem Plant	Reactors	Fugitive Control	Inert Gas Blanket Vented To Caustic Scrubber
		Spill Containment	Diked Area, Sealed Floor and Sumps
		Spill Control	Liquid Level Alarms, Overflow Containment Capability
Organic Separation	Aqueous Organics Plant	Spill Containment	Diked Area, Sealed Floor and Sumps
		Spill Control	Liquid Level Alarms, Overflow Containment Capability
		Fugitive Control	Fume Hood on DAF Unit Exhausted To Scrubber
Immobilization	Immobilization Plant	Fugitive Control	Indoor Operation, Baghouse On Reagent Silos, Water Spray and Flexible Curtain on Pug Mill
		Spill Control	Indoor Operation, Diked and Sealed Floor and Sumps
Landfill	Residue Repository	Water Management	Indoor Cell
		Leachate Control	Liquids Restricted From Cell, Dual Liner System For Leachate Monitoring and Collection, Groundwater Monitoring
Water Management	Liquid Residuals Treatment	Trace Contaminant Control	Activated Carbon Filter For Organics, Mechanical Evaporation for Total Dissolved Solids
	Surface Water Management	Trace Contaminant Control	Collection of Surface Water From Active Areas, Water Quality Monitoring and Treatment As Necessary

In addition, provision within the facility will be made for recovery of solvents using a distillation unit. While described as part of the facility development below, this capability would only be included in the absence of equivalent capability elsewhere in the province. The facility will also offer the flexibility to add volume reduction or other pretreatment capability as needs are identified in the future. Similarly, the facility can act as a base for a dedicated collection capability serving the Winnipeg area and for service capability supporting source based management.

Figure 4.9 provides a general layout of the facility developed on a stand alone basis. It will occupy a 4 hectare (10 acre) fenced site with secured access over which stormwater management is applied. It should be noted that the layout will be optimized on a site specific basis to suit topography, hydrogeological conditions, off-site infrastructure and access availability. It should also be noted that acquisition of a larger site than proposed for development may be desirable to allow for optimization of the plot plan, expandability, integration with other waste management activities and adjacent land use control.

The principal components of the facility are outlined below.

- Operations Building containing:
  - Administration offices;
  - Materials receiving and shipping;
  - Drum emptying/cleaning/washing facilities;
  - Segregated drummed storage;
  - Bulk inorganic storage;
  - Sorting and packaging area;
  - Solvent recovery unit (optional); and,
  - Operating plant support infrastructure.
- Tank Farm containing:
  - Bulk organic storage; and,
  - Fuel blending capability.
- PCB Storage Building;
- General Site Infrastructure including:
  - Surface water collection and segregation system;
  - Environmental monitoring systems;
  - Emergency response capability;
  - Fire protection and detection; and,
  - Safety and security.

Figure 4.10 illustrates the overall flow of material in the facility. Materials will be received at the facility by truck. Based on the design capacity, this would involve an estimated 4 vehicle movements per working day into the facility. Upon receipt, they will be subject to material identity verification procedures, segregated and entered into the material control and tracking system.

Liquid waste will be received in drums, or in bulk tankers. Bulk liquids will be pumped directly to dedicated storage. Drummed materials will be unloaded, classified, and moved to the drum storage area. Damaged or leaking drums will be placed into overpacks. Drummed materials destined to be blended for fuel or other resource recovery alternatives will be emptied, and pumped by means of a piping network to bulk organic storage.

Where possible, empty drums will be returned to the generator for reuse with the same waste stream. Drums which cannot be salvaged will be decontaminated and sent to a metal recycler.

Bulk solid materials requiring direct immobilization will be stored in the unloading bay prior to shipment to the central facility.

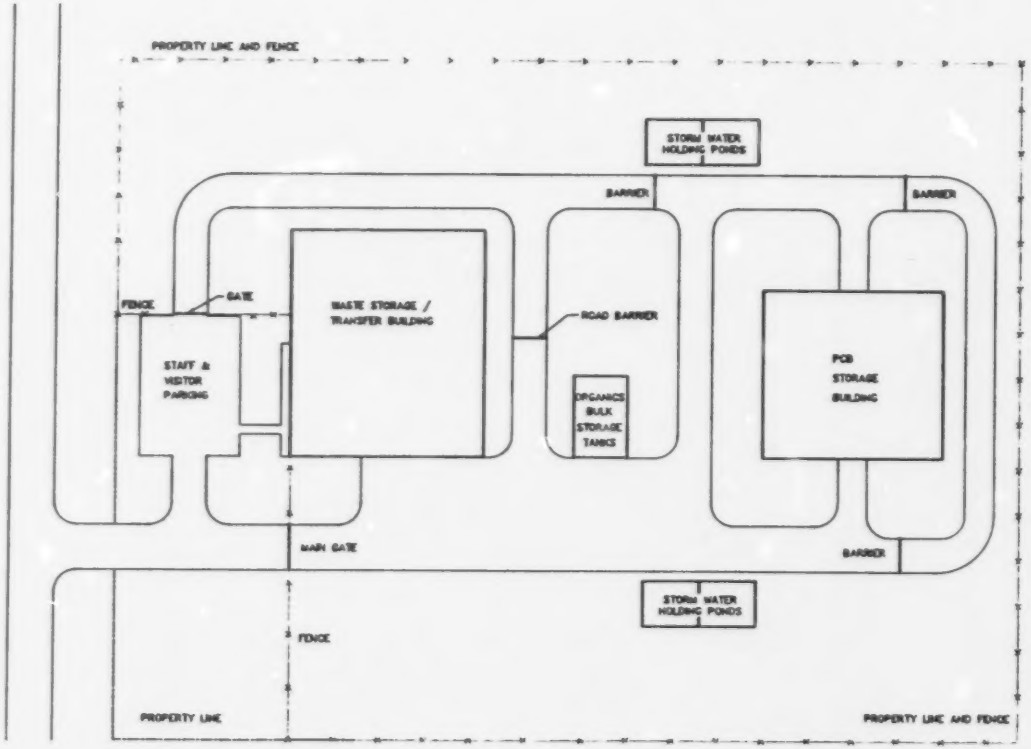
Waste storage in the organic tank farm will be segregated into the following groups:

- Aqueous organics;
- Waste solvents;
- Waste oils;
- Organic sludges;
- Halogenated wastes; and,
- Blending.

Each tank will typically be of carbon steel construction, of vertical cylindrical configuration, conical bottomed, provided with a mixing/blending device and insulated. All organic storage and blending tanks will be blanketed with an inert gas, such as nitrogen, to protect against explosion and fire.

Liquid organic wastes will be blended prior to being shipped to resource recovery management facilities. These materials include aqueous organics, waste solvents not directed to solvent recovery, waste oils, organic sludges and halogenated wastes. Based on their characteristics, they will be proportionately added to the blending tanks to meet the specifications required by the appropriate receiving facility. The intent is to optimize heating value, as well as sulphur, chlorine and moisture content. Blending tanks will be provided with agitators, as well as sample ports, to confirm waste characteristics prior to shipment.

Inorganic materials received at the facility will be in either drum or bulk form. Drums will be transferred to inorganic drum storage for shipment to the central facility, or for bulking into bulk inorganic storage. Dedicated and segregated storage will be provided for incompatible materials. As with the organic materials, bulk wastes will be pumped directly to bulk storage, whereas drums will be emptied and subsequently transferred to bulk storage as required.



SCALE

Manitoba Hazardous Waste Management Corporation

Reid Crowther

Reid Crowther & Partners Ltd.

project: Facility Design Specification and Technology Characterization

STORAGE / TRANSFER FACILITY
SITE LAYOUT

designed: J.M. | scale: | date: 88-12-13

drawn: S.C. | project no.: 01288-700

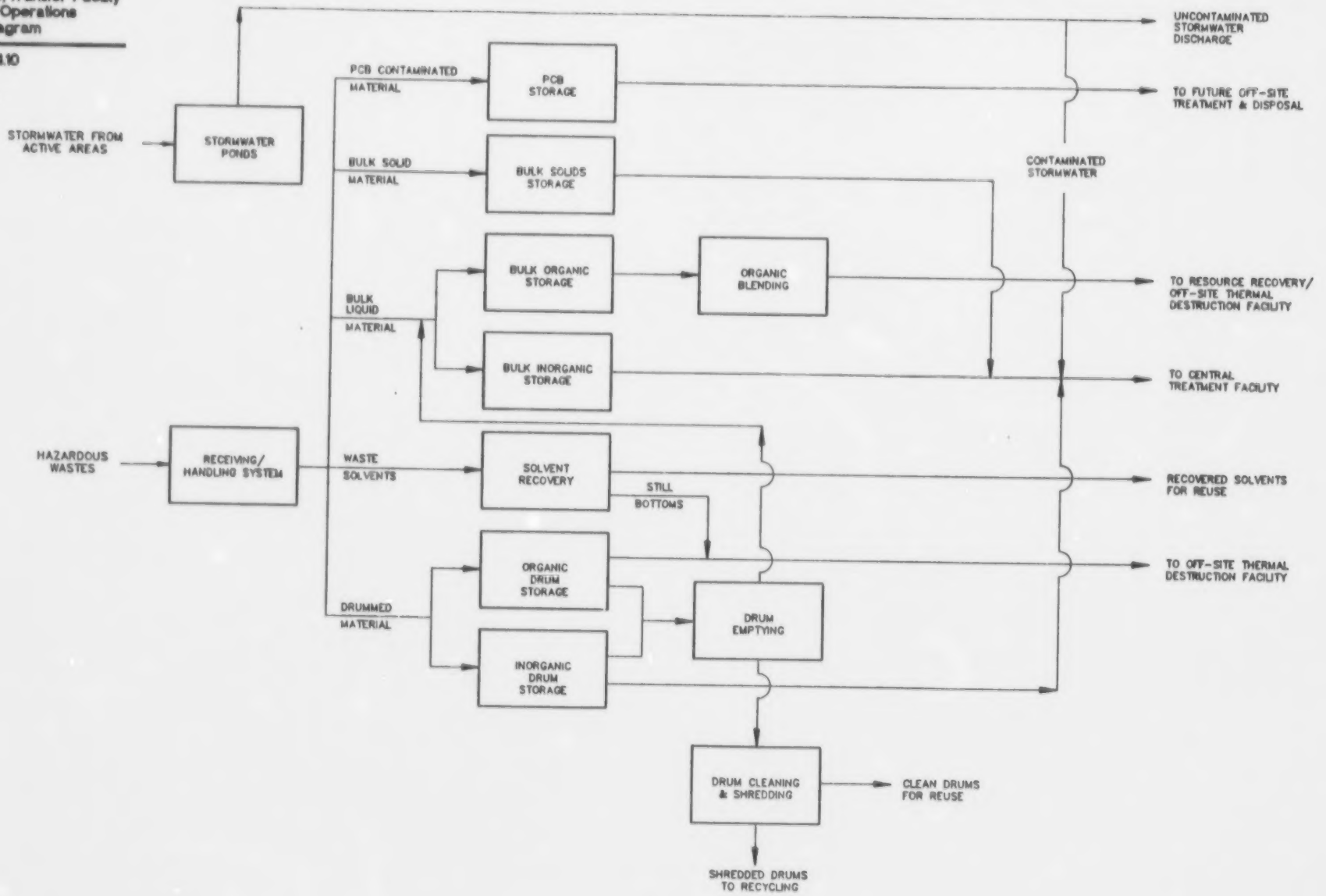
checked: D.A.T.

approved:

drawing no./figure: 4.9 | rev.:

Storage/Transfer Facility
Overal Operations
Flow Diagram

Figure 4.10



In addition to the storage and blending operations outlined above, a solvent recovery operation may be incorporated into facility operations. Solvent will be recovered at the rate of 250 litres per hour based on current market expectations. Additional capacity could be gained by running a second operational shift. The process would be manned and monitored while in operation. The recovered solvents will be repackaged and returned for industrial use.

A PCB storage building will be provided to ensure secure and central storage of PCB contaminated materials, including items such as contaminated soils, light ballasts, and contaminated liquids, as well as transformers and capacitors. Building design will be in accordance with all applicable provincial and federal guidelines and regulations specific to PCB storage. In particular, a high level of fire prevention, detection and protection will be provided.

With respect to operation staffing, five personnel will be associated with facility operation. Positions include:

- Facility Supervisor;
- Operations Technician;
- Operations Staff; and,
- Clerical Support.

Preliminary cost estimates, based on the initial design, indicate that the stand alone storage/transfer facility involves a direct capital investment of $5.4 million, excluding financing and capitalized development costs. The annual operating costs are estimated at $0.8 Million.

In the following, the design philosophy and basis applied to the storage/transfer facility is summarized and each of its major components and operating systems is described in detail.

4.3.2 Design Philosophy and Basis

The design philosophy adopted for this facility acknowledges that a level of environmental and public safety protection similar to that associated with a treatment and disposal facility should be applied. This is primarily due to the major focus of the facility being the handling of organic materials, many of which are volatile and flammable. Such operations inherently pose environmental and safety risks, as has been demonstrated by the past performance of inadequately designed, operated and monitored facilities. For this reason, the proposed facilities will be designed to a standard such that these risks are competently mitigated, and can be seen to be so.

The storage/transfer facility design is based on the following principles:

- Facility design and operation shall be in accordance with all pertinent acts, codes and regulations applicable to the development;
- Design and operation of the facility will provide for protection of all potential paths of environmental contaminant exposure such that the risk of such exposure to environmental resources generally, or humans directly, is minimized and mitigated;
- The capability to demonstrate provision of this high level of environmental and human protection shall be provided for during operation and subsequent to the closure of any facility components;
- In achieving the above, the facility shall employ proven commercially available technology while recognizing the potential for technical innovation and improvement in the future; and,
- The facility design shall facilitate the ability to fully control and track the course and disposition of all material throughout the operation and provide for full public access to the operation.

The design basis adopted for the facility incorporates the following considerations:

- The design capacity of the facility will be 3,000 tonnes/year of waste oils and greases, 2500 tonnes/year of miscellaneous organic waste materials, and 1500 tonnes/year of inorganic material, based on an average material retention time of one month;
- The design will recognize the "extreme continental" climate classification of Southern Manitoba by maximizing the housing or sheltering of operations;
- Provision shall be made for the collection, segregation and sampling of stormwater, and in the event of contamination, its treatment at suitable facilities;
- Continuous performance monitoring of all process operations will be included, along with control of process parameters and provision for warning and shut down;
- Provision shall be made for the collection and scrubbing of volatile vapors in all areas of the operation subject to potential fugitive emission release;
- A high level of fire protection will be incorporated in recognition of the flammable nature of materials handled;
- Provision will be made for the materials identity verification;
- Material routing through all facility operations will be controlled through a computerized tracking system;

- The overall facility design shall incorporate environmental monitoring of indoor air, surface water and ground water quality;

- Emergency response capability will be provided to respond to any upset events that could occur on the facility site, and off-site as material is being transported between the waste generator, the storage/transfer facility, and from the facility to treatment facilities; and,

- The design will provide for ease of public access in recognition of an open policy respecting facility operation and its monitoring.

4.3.3 Description of Facility Components

The following provides a detailed description of the scope and operation of the various facility components listed in Section 4.3.1.

a) Operations Building

This is a 2200 m^2 building housing an administration office, materials receiving, segregated storage, and treatment operations, along with supporting utilities, control systems and operating personnel support infrastructure. The general layout of the operations building is illustrated in Figure 4.11.

It is not proposed to provide any laboratory capability in the facility, apart from sample collection and handling. These services will either be contracted with local commercial laboratories or provided by the central facility laboratory.

Overall features to be incorporated into this building include flexibility to expand operational activities, positive management of indoor air and particulates and a high standard of fire protection. Each operational area is described as follows:

i) Materials Receiving and Shipping

After materials verification, vehicles will be unloaded in a covered area of the building. Provision will be made for unloading shipments received in drums, as bulk liquid and as bulk solid. A range of commercial truck configurations will be provided for including semi-trailer vans typically carrying 80 drum loads, smaller vans carrying small quantities of materials, bulk liquid tankers up to a capacity of 20 tonnes, as well as covered bulk solid carriers.

The materials handling capability provided includes:

- Separate unloading and loading stations for major waste types;

- Verification sampling capability;

- Facilities for transferring drummed materials to bulk storage tanks;

- Facilities for transferring bulk liquids from storage tanks to out going vehicles;
- Individual drum movements utilizing motorized hand-guided dollies as well as palletized drum movements utilizing fork lift vehicles;
- Drum dumping and pumping facilities, complete with the capability to collect fugitive emissions and direct them to an appropriate scrubbing system;
- An area for sorting and packaging materials such as household hazardous waste in lab packs;
- A drum washing station to decontaminate drums for reuse; and,
- A drum shredding station for disposing of spent drums as scrap.

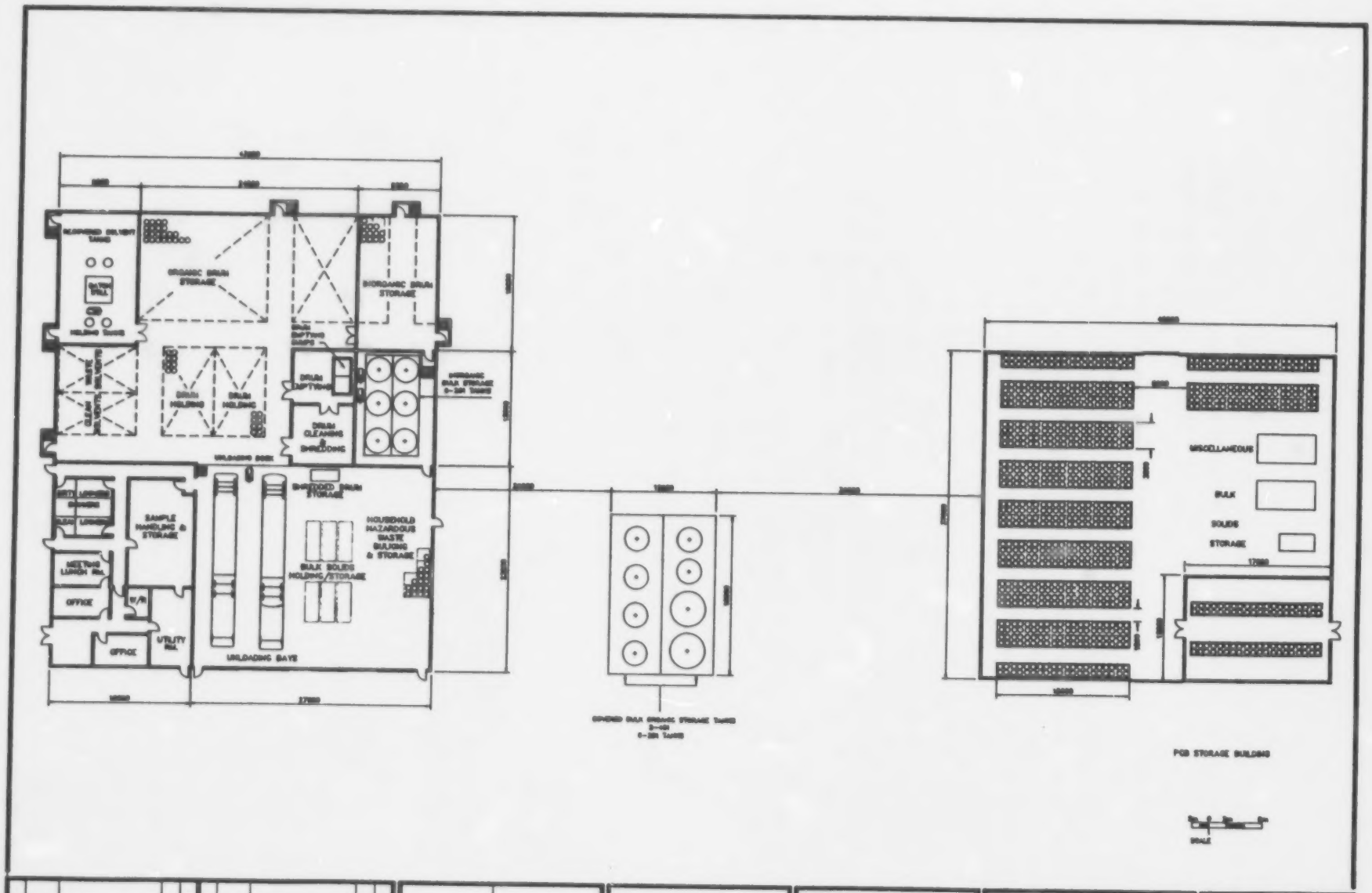
ii) Materials Storage

The storage area for incoming waste will be immediately adjacent to the receiving area and provides the following features:

- Curbed and segregated storage areas for drummed acids, alkalis, cyanides and various types of organic material (halogenated, non-halogenated etc.);
- Indoor cylindrical bulk storage tanks for inorganic wastes with nominal capacities of $20m^3$;
- All bulk liquid inorganic storage tanks to be vented under slightly negative pressure to a scrubbing system; and,
- All bulk storage tanks will be dyked with sufficient capacity to contain a volume at least equal to 110% of the volume capacity of the largest tank enclosed by the dyke.

iii) Solvent Recovery

In the absence of this capability elsewhere within the province, a solvent recovery operation could be incorporated into the storage/transfer facility. The process flow diagram for the recovery of solvents is provided in Figure 4.12. Drummed solvent wastes will be transferred into day tanks for feed to the distillation unit. In the distillation units, solvents will be separated from contaminants such as oil, grease and water. The recovered solvents will be collected in bulk receiving tanks and transferred to drums to await shipment. Still bottom residues will be contained in drums, and stored in the organic waste holding area to await trans-shipment for off-site disposal. A more detailed process description is provided below.



Manitoba Hazardous Waste Management Corporation

Reid Crowther

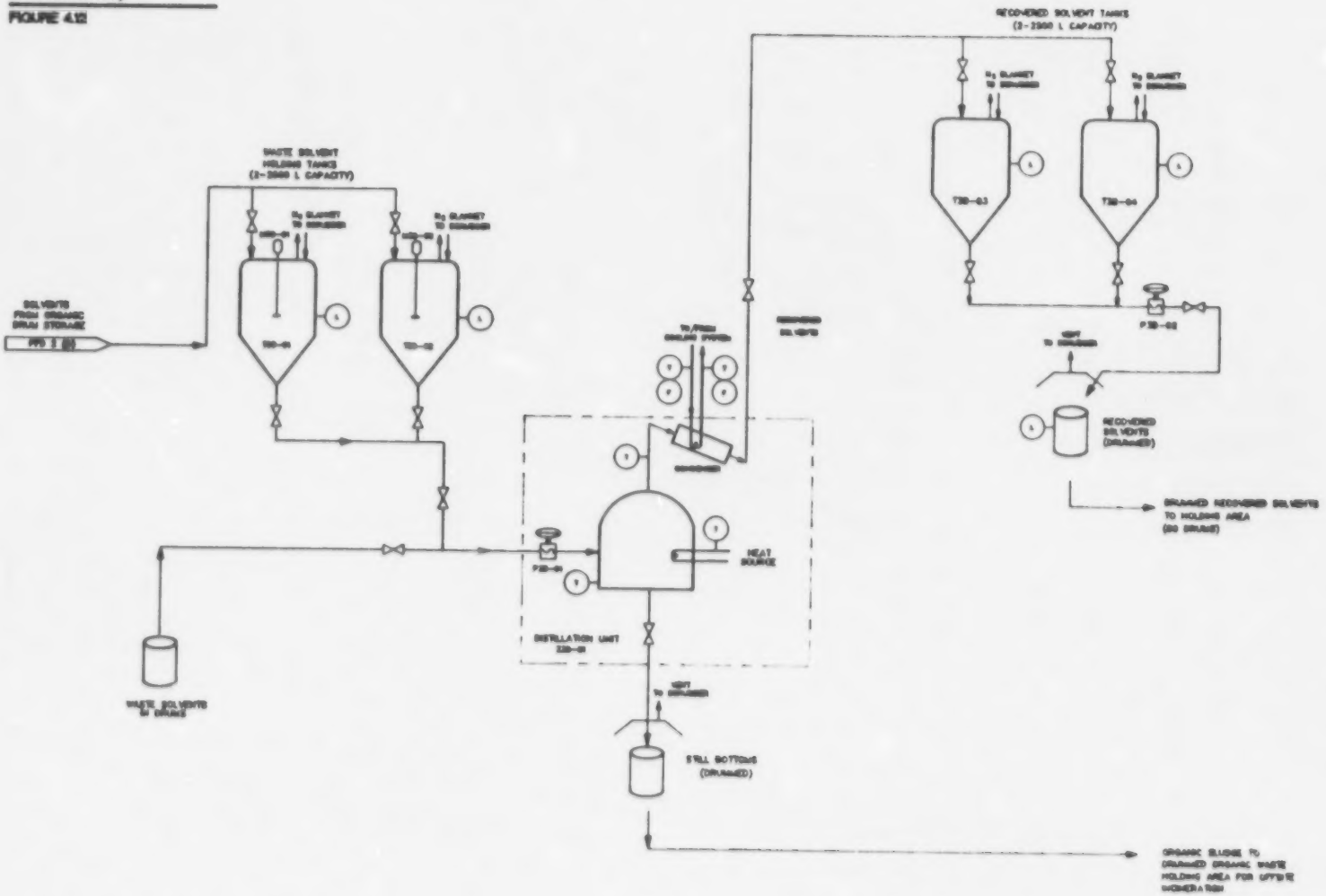
project: Facility Design Specification and Technology Characterization

STORAGE / TRANSFER FACILITY GENERAL ARRANGEMENT

designed: H.L.H.
drawn: D.C.
checked: A.W.N.
approved:
scale:
date: 90-03-23
project no.: 0130-700
drawing no./figure: 4.11
rev.:

Process Flow Diagram
Solvent Recovery

FIGURE 4.12



Waste solvents are pumped from the organic drum emptying area to one of two holding tanks, for feed to the distillation unit. Alternatively, solvents may be fed directly from their drums to the still.

The distillation unit consists of an evaporator, heated by electricity or steam, and a condenser, cooled by water. Based on current market estimates, the unit would have a capacity of approximately 2000L per 8 hour day. As heat is added to the evaporator, the lowest boiling compounds, generally the solvents, evaporate first. The vaporized solvents are then condensed, and flow by gravity to the recovered solvent tanks or drums. Higher boiling point contaminants, such as oils, greases and water are left behind as still bottoms. This residue is periodically pumped into drums for ultimate off-site disposal.

The unit anticipated at this time will be capable only of simple distillation, as opposed to fractional distillation. Thus, if a mixture of contaminated solvents is fed to the system, a mixture of clean solvents will be recovered. The unit will not be able to fractionate the solvent mixture into its pure components.

A packed tower could be added to the system at a later date, should solvent fractionation be desired. An automatically controlled manifold would then direct different solvents to different recovered solvent holding tanks.

The features of the distillation unit will include the following:

- A positive displacement feed pump, controlled by internal liquid level controller;
- Sludge (bottoms) scrapers;
- Recirculation and discharge system (pump or auger);
- A vacuum system to facilitate the processing of high boiling point solvents (>200^{0}C); and,
- Sensors to monitor the temperature of the heating media, the residual liquids (bottoms), the vapor phase, and the condenser water.

The recovered solvents will flow by gravity to one of two recovered solvent tanks. The recovered solvents will ultimately be transferred to drums for return to the solvent users.

The entire solvent recovery area will be vented to the facility's fugitive emission scrubbing system and dedicated ventilation will be provided around the distillation unit and the drum emptying and filling areas.

iv) Operating Plant Support Infrastructure

The general infrastructure required to support the facility operation follows below.

- Utility services including:
  - Nitrogen system;
  - Steam generation;
  - Compressed air;
  - Instrument air;
  - Electrical supply;
  - Water supply; and,
  - Sanitary waste disposal.
- Personnel lunchroom area;
- Personnel wash-up/restroom areas including working clothes change area segregated from the street clothes change area by a mandatory shower/wash-up facility; and,
- In plant emergency response equipment for first aid, spill cleanup, and fire fighting.

b) Organic Tank Farm

The organic tanks will be located outside of the operations building. This will provide separation of larger volumes of flammable material from the operations building. These tanks will provide segregated storage of commonly received organic liquids as they are received, either directly from tankers or transferred from drums. In addition, they will provide a blending capability such that materials suitable for use as fuels can be mixed prior to shipment off-site.

The specific features of this facility will include:

- Tracing and insulation of all tanks and connecting piping for winter operation;
- Maintenance of tank contents under an inert gas blanket vented to a gas scrubbing system;
- Emergency equipment access to all sides of the tank farm; and,
- Dyking of the tank area with sufficient capacity to contain a volume at least equal to 110% of the volume capacity of the largest tank enclosed by the dyke.

During final design, consideration will be given to sheltering the tank farm such that the amount of potentially contaminated stormwater collected in the dyked area will be minimized.

c) PCB Storage Building

A PCB storage building will be incorporated into the storage/transfer facility. Its purpose will be to provide secure, dedicated and centralized storage of PCB contaminated materials until access to a treatment facility becomes available. Figure 4.11 provides the proposed layout of the PCB storage building.

The building, designed to accommodate 900 tonnes of material, will be capable of storing items such as contaminated soils, light ballasts, other small electrical components and contaminated liquids, delivered in drum or bulk form. In addition, larger items of electrical equipment, such as capacitors and transformers will be provided for. It is estimated that over 90% of the material received will be solids with a small quantity of liquid material such as transformer oil being involved. Little of this material is flammable in nature but a high level of fire protection will be provided to prevent any combustion exposure.

Storage arrangements for the material will provide for visual inspection of all containers. Drums of solid contaminated materials will be stored four drums deep on pallets, which will provide for visual inspection of each container. Liquid materials will be stored two deep, such that physical inspection and direct forklift access is possible.

Building design will be in accordance with applicable provincial and federal guidelines and regulations, specific to PCB storage. In particular, the design and operation of the facility will provide the following features:

- Access shall be controlled and restricted to authorized personnel;
- The floor will be constructed of concrete, and coated with a durable PCB-resistant coating;
- Curbing will be incorporated around the perimeter of the floor to contain liquid within the confines of the building;
- PCB wastes will be stored separately from other substances to minimize the risk of combustion;
- PCB solids, such as small capacitors or contaminated soils, will be stored in either drums or leak proof steel containers, and placed on pallets;
- Larger transformers will be drained, and stored in drip pans; and,

- Segregated storage will be provided for liquid flammable materials contaminated with PCB's. This area will be enclosed within the building by a fire-resistant barrier.

Dedicated fire detection and protection measures for the building will include the following:

- A fire control and emergency procedures plan will be developed in conjunction with the local fire department;
- A smoke and fire detection system shall provide warning of an incident;
- Portable fire extinguishers shall be strategically located within the building;
- A fire suppression system shall be incorporated into the flammable materials storage section of the building; and,
- Materials for cleanup, such as sorbent and solvents, shall be maintained on-site for cleanup requirements.

d) Site Control, Protection and Monitoring Systems

i) Surface Water Collection and Segregation System

Stormwater which settles on the active areas of the facility will be collected, either by gravity drain to the stormwater retention ponds, or via a piped collection network. Areas considered to be susceptible to contamination include all areas of vehicular traffic, the dyked area within the tank farm, as well as building roofs. The ring road surrounding the facility will be drained to a separate pond, as this road will only see traffic in the event of an emergency situation. The pond will provide the capability to collect water from this area should the need arise.

Retention ponds will be sized and designed in accordance with local precipitation factors, with synthetic liners to prevent migration of potential contaminants into the environment.

The water in the ponds will be sampled and analyzed as required. In the presence of trace contamination, the stormwater will be collected and transferred to the central treatment facility for processing in the liquid residuals treatment plant. Uncontaminated water will be discharged to a municipal sewer, if available, or as surface water discharge.

ii) Environmental Monitoring Systems

An environmental monitoring capability, similar to that used at the central treatment facility, will be incorporated to ensure the safety of facility personnel, the general public and the environment. This capability is described below.

- Emission Monitoring

  An emission monitoring program will address any potential contaminant discharge which could pose a risk. This program will address both atmospheric emissions, as well as those to surface water courses.

  Potential gaseous emissions of concern will consist mainly of extremely low concentrations of volatile organic compounds released during normal operation from vent emission control equipment. Aqueous discharges will consist of stormwater runoff.

- Ambient Environmental Monitoring

  This program will encompass the monitoring of air quality, and surface and ground water. Ambient air will be monitored on a periodic basis. Groundwater monitors will be established within the facility perimeter such that periodic inspection can be undertaken.

  Final plans with respect to ambient monitoring will be developed in accordance with regulatory requirements and public consultation.

- Occupational Health and Safety Monitoring

  Safety procedures will be established based on an analysis of potential hazards, and personnel protection measures will be selected in response to these. As a minimum, employees will be equipped with appropriate work clothing for exclusive use on the site and will be required to wear breathing apparatus where direct transfer of volatile materials may be involved.

  Pre-employment, as well as periodic screening medical examinations will be mandatory for site personnel who will be required to work with the potential contaminants at the facility.

iii) Emergency Response Capability

An emergency response plan will be developed to handle emergencies which may arise at the facility in the course of operations, using on-site resources, and potentially off-site assistance. Ongoing communication with local fire departments, medical agencies and other public emergency response agencies will be undertaken to provide planning coordination, and to maximize the plan's integrity and effectiveness. In particular, current information on what materials are on site will be maintained at all times and be available to both on-site and off-site emergency response capability.

Objectives of the emergency response plan will be as follows:

- Appraise the situation and implement immediate action to stop, contain or minimize the release of contaminants arising form incidents both on and off site;

- To provide the capability to minimize the impact of an incident with respect to both facility personnel and the local community;

- To contain and minimize damage to the environment, as well as to ensure the integrity of the facility; and,

- To provide and maintain an effective response capability for on-site incidents, and coordinating with local agencies in dealing with an occurrence not related to facility operations.

iv) Data Management System

The data management system will provide an integrated information handling capability for the efficient planning, coordination and management of facility operations. These operations will include the following:

- Materials flow - reception, handling and storage;

- Data flow - acquisition, processing and storage;

- Coordination and planning of operations and administrative functions;

- Maintenance of a common database to serve all users;

- Generation of reports; and,

- Immediate retrieval of required information.

This system will provide an audit trail to ensure that operating, regulatory and safety procedures are being followed.

v) Fire Detection and Protection

A fire detection system will be included to provide for the safety of personnel, and the integrity of the facility components, through the continual monitoring of equipment and buildings to provide early warning of a potential occurrence. The alarm and detection system will consist of a centrally located monitoring station, combined with strategically located detection devices throughout the facility. The system will have the capability of raising an alarm, and indicating trouble status and fire location. The overall system will be finalized during the detailed design phase of the project.

The fire protection system will provide the facility with the capability of minimizing and controlling the consequences of a fire. The following discussion provides a brief description of the various systems that will be incorporated into the facility design, to be further evaluated through detailed design, and with respect to risk management recommendations.

- The firewater system will incorporate a dedicated supply of firewater, capable of meeting the requirements of a major incident. The exterior system will comprise hydrants and monitors, whereas the fire protection systems located within the buildings will consist of standpipes and hose cabinets, and sprinkler and deluge systems. The main firewater pump will be 100% spared, with the spare provided with an alternate source of power.

- In addition to the firewater system, a foam fire suppression system will handle fires of a chemical nature. The exact nature of this system will be addressed at the detailed design stage.

- Portable fire extinguishers will be located, as required, throughout the entire facility.

In addition to the above, a number of measures will be incorporated into facility design to minimize the potential of an incident. Some of these measures include:

- Planned access for fire fighting purposes;

- Incorporation of appropriate materials of construction for buildings and structures within the facility;

- The provision of fire separation walls between adjacent areas to ensure appropriate protection;

- The design of electrical distribution systems to the appropriate classification for the service; and,

- Ventilation and inert gas blanketing systems to reduce hazard potential.

vi) Safety and Security

Safety and security systems will be incorporated into the facility design to prevent on-site accidents, and to prevent unauthorized access to the facility. To achieve this objective, the following will be implemented:

- Engineered containment systems will minimize the potential for the release of contaminants to the environment;

- Ventilation systems will be designed to minimize the release of fugitive emissions to atmosphere;

- Fire protection systems will ensure the integrity of the facility, as well as the safety of plant personnel;

- Workplace hazard designations will specify requirements for specific safety and personnel protection equipment, including clothing, gloves, footwear, safety hats, eye/face protection and hearing protection;

- Safety showers and eyebaths will be located in areas where the handling of hazardous chemicals is anticipated;

- Portable respirators will be located where the potential exists for a release of hazardous gases from an upset condition and will be required to be worn when direct handling of materials having the potential for their release is occurring; and,

- An appropriate level of site security will be provided, including perimeter fencing and controlled access.

vii) Emission Controls

- While included with the descriptions of the various facility components, Table 4.3 provides a summary of the various emission controls incorporated into the facility.

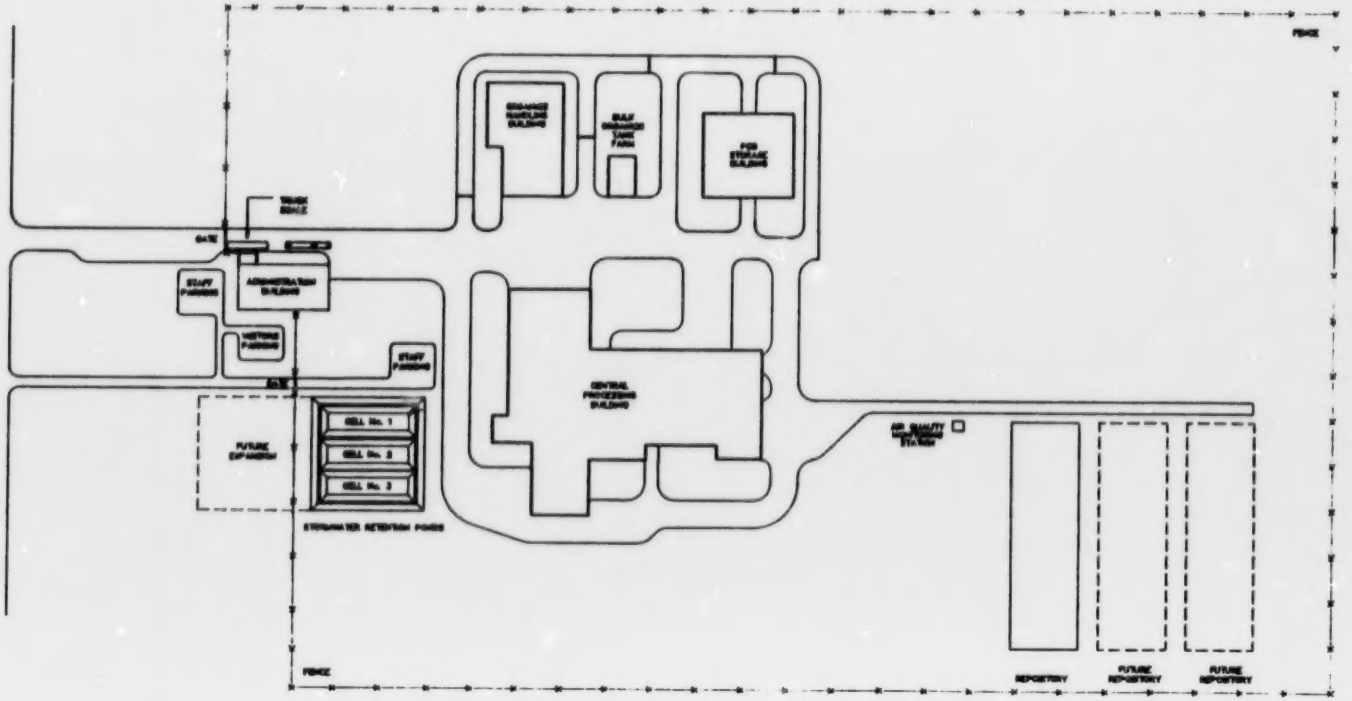
4.4 Combined Storage/Transfer and Central Treatment Facility

In Sections 4.2 and 4.3, separate developments of a central treatment and storage/transfer facility respectively are described in detail. In this section, the option of combining these two facilities at a common location is described. Like the storage/transfer facility, the combined facility option would be applicable to locations in or relatively near to Winnipeg. The overall scope of its operation would be the collection, accumulation, storage, bulking and re-shipment of organic materials, and the physical/chemical treatment of inorganic materials with associated secure disposal of treatment residues. All of this would be done within a common operating infrastructure, inclusive of utilities, technical and analytical services, information systems, surface water management, safety and security, environmental monitoring and emergency response capability.

The general layout of the combined facility is illustrated in Figure 4.13, recognizing that this would be optimized on a site specific basis in respect to hydrogeological considerations, surface topography and site access. The site would involve the development of 17 hectares (42 acres) and would logically be surrounded by lands over which future land use control was exercised, either by direct ownership or development restrictions.

TABLE 4.3
SUMMARY OF
EMISSION CONTROL MEASURES
STORAGE/TRANSFER FACILITY

Component	Facilities	Objective	Pollution Control Measures
Waste Reception	Sampling	Fugitive Control	Specialized Sampling Protocol
Waste Storage	Drum Decanting and Shredding	Fugitive Control	Isolated Area Vented Through Scrubber
		Spill Prevention	Diked and Sealed Floor and Sumps
	Bulk Storage	Fugitive Control	Inert Gas Blanket Vented to Scrubber
		Spill Control	Diked Area, Sealed Floor and Sumps, Liquid Level Alarms
	Drum Storage	Spill Control	Diked Area, Sealed Floor and Sumps
		Leakage Control	Routine Inspection and Repackaging
	Solids Storage	Fugitive Control	Indoor Storage in Covered Bins
Solvent Recovery	Distillation Unit	Spill Containment	Diked Area, Sealed Floor and Sumps
		Spill Control	Liquid Level Alarms, Overflow Containment Capability
		Fugitive Control	Isolated Area Vented Through Scrubber
Water Management	Surface Water Management	Trace Contaminant Control	Collection of Surface Water From Active Areas, Water Quality Monitoring and Treatment As Necessary



SCALE

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Manitoba Hazardous Waste Management Corporation

Reid Crowther

Reid Crowther & Partners Ltd.

project: Facility Design Specification and Technology Characterization

COMBINED STORAGE/TRANSFER & CENTRAL TREATMENT FACILITY
SITE LAYOUT

designed: D.A.T.	scale:	date: 90-03-30
drawn: P.A.L.		project no. 01200
checked: A.M.M.		drawing no./figure: 4.13
approved:		rev.

The principal components of the facility are described below.

- Administration building containing:
  - Offices;
  - Site access control and security; and,
  - Weigh scale.
- Physical/chemical treatment operations building containing:
  - Materials receiving;
  - Materials storage;
  - Inorganic physical/chemical treatment plant;
  - Organic physical/treatment plant;
  - Solid treatment residue immobilization plant;
  - Liquid residuals (water) treatment plant;
  - Laboratory; and,
  - Operating plant support infrastructure.
- Solid treatment residue repository including:
  - Housed active secure repository cell; and,
  - Completed secure repository cells.
- Organic transfer operations building containing:
  - Materials receiving and shipping;
  - Drum emptying/cleaning/washing facilities;
  - Segregated drummed storage;
  - Sorting and packaging area;
  - Solvent recovery unit (optional); and,
  - Operating plant support infrastructure.
- Tank farm containing:
  - Bulk organic storage; and,
  - Fuel blending capability.
- PCB storage building.

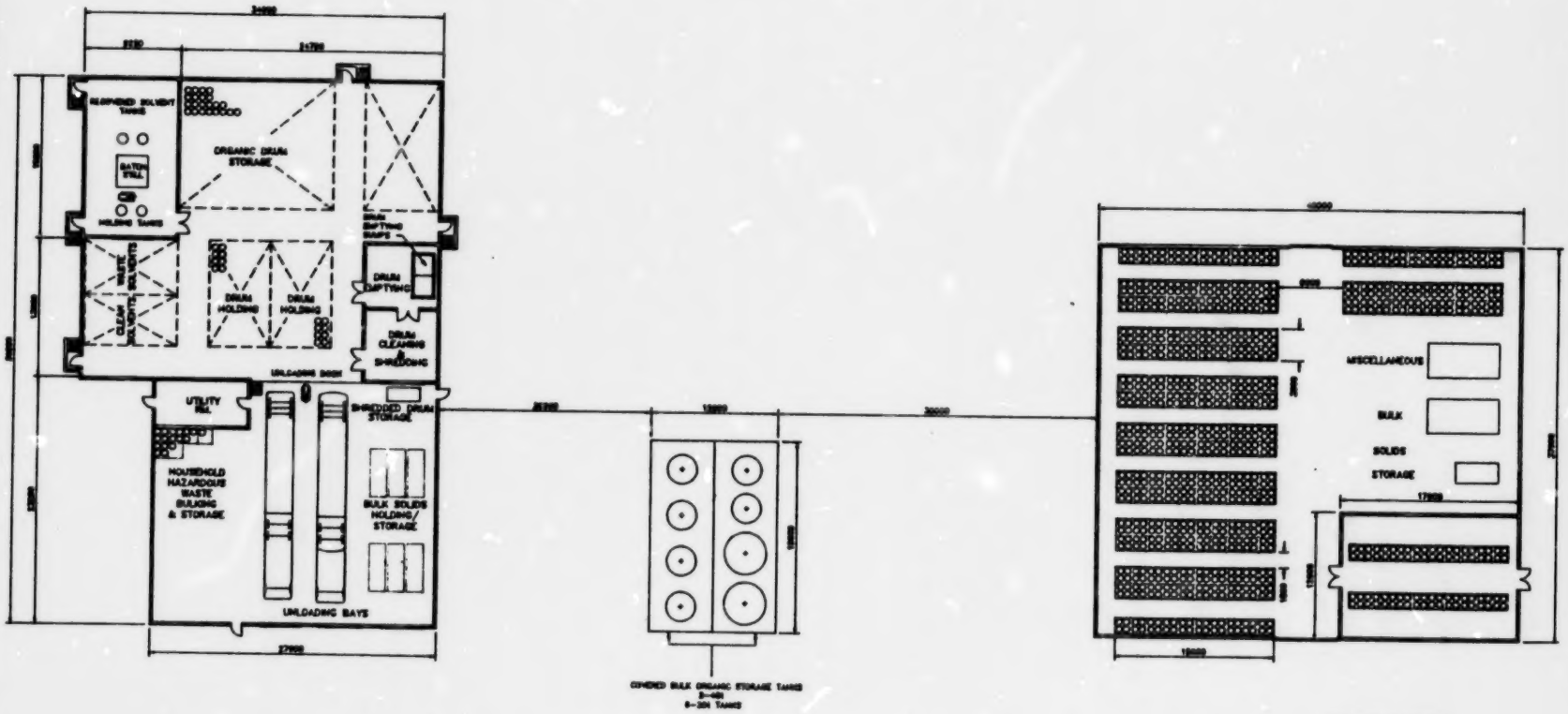
- Site control, protection and monitoring including:

  - Surface water collection and segregation system;
  - Environmental monitoring systems;
  - Emergency response capability;
  - Data management system;
  - Process control;
  - Fire detection and protection; and,
  - Safety and security.

These components are essentially as described in the previous two sections applicable to the separate facility configurations, except that areas of duplication are eliminated as appropriate. For example, the transfer operations building will have the inorganic receiving, bulking and shipping operation removed as this is provided for in the physical/chemical treatment building. Similarly, common services such as personnel facilities and laboratory operations will be located in the main treatment building. The overall size of the transfer operations building will be reduced to 1600 m^3. The revised layout of this building is illustrated in Figure 4.14.

Figure 4.15 illustrates the overall flow of material throughout the facility. This is essentially a combination of the two facility components as described in previous sections except that the inorganic material will be routed directly to the physical/chemical treatment plant. Other changes include the on-site capability to treat aqueous residues from drum cleaning operations in the organic transfer operation and the routing of residual organic material from the aqueous treatment plant to the organic transfer building. The combined facility also offers the laboratory support capability for on-site identification of materials entering the storage/transfer component and process control support for blending and potentially solvent recovery operations. The overall capacity of the combined facility will be the sum of the capacities applicable to the separately developed facilities. An estimated 6 transport vehicles per day will be using the facility.

The overall design philosophy principles proposed for the separate facility configurations will remain applicable to the combined facility. In particular, the high degree of engineered environmental protection will be maintained. This is in recognition that both types of operations involve similar levels of environmental risk, although variation exists respecting the specific focus of the required protection and mitigation applied. For example the emphasis on fire protection and fugitive emission control applicable to the storage/transfer operation will be provided for, as will the ground and surface water protection measures highlighted in the design of the central treatment facility.



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Manitoba Hazardous Waste Management Corporation

Reid Crowther & Partners Ltd.

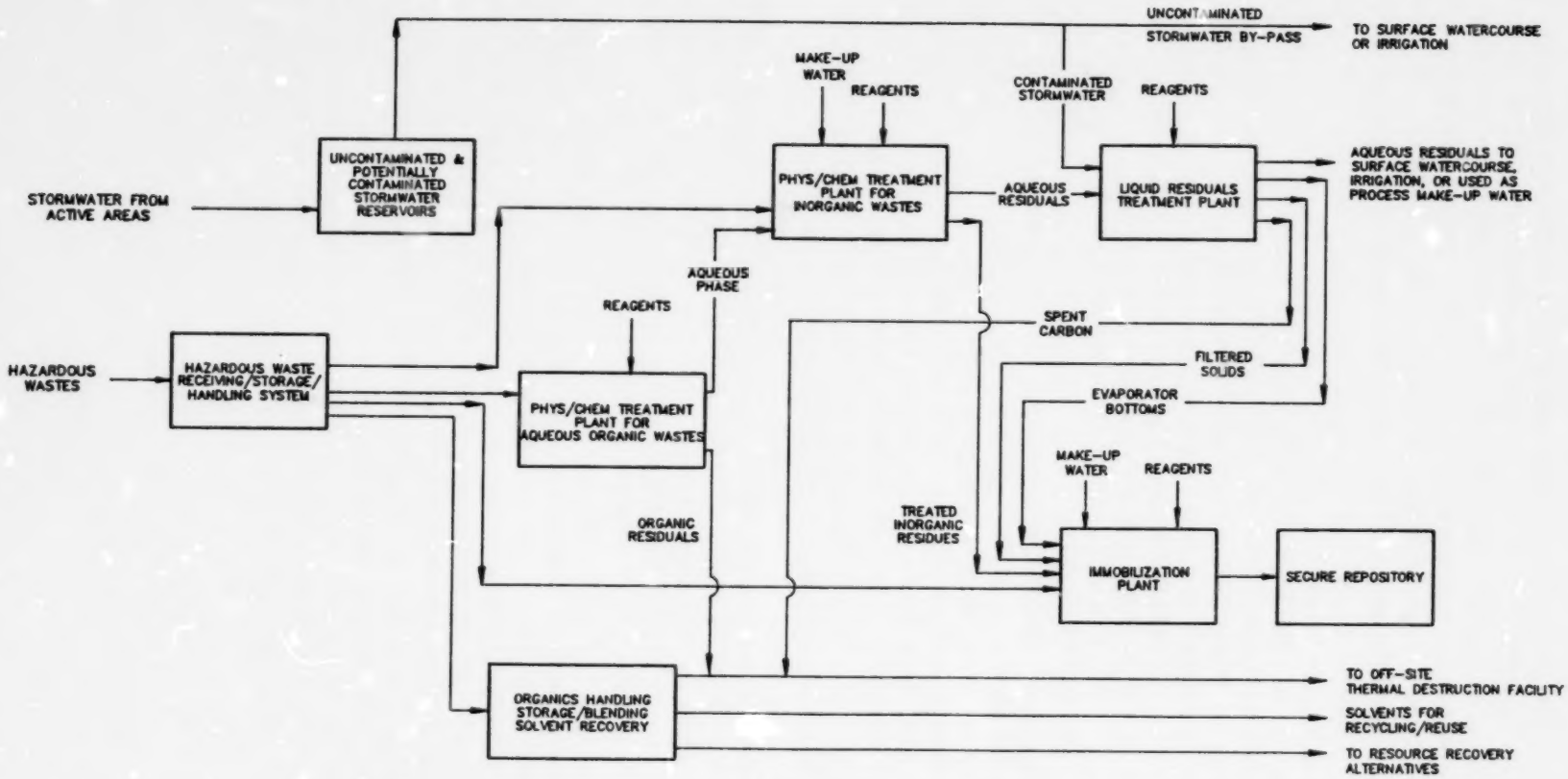
Facility Design Specification and Technology Characterization

COMBINED FACILITY
ORGANICS HANDLING
GENERAL ARRANGEMENT

drawing no./figure: 4.14

Combined Facility
Overall Flow Diagram

Figure 4.15



A number of advantages can be associated with the combined facility configuration. These are largely associated with the efficiencies associated with a common operating infrastructure, such as administrative and personnel support, operating plant support, and off-site infrastructure requirements, as well as the logistical advantages associated with operating from a single location. In particular, the duplication and redundancy of a number of servicing and facilities' operational requirements and equipment would be avoided, including:

- Transportation from the storage/transfer facility to the central facility;
- Double handling of waste materials;
- Maintenance equipment and personnel;
- Data management systems;
- Analytical support;
- Stormwater collection and segregation; and,
- Site protection, control and monitoring systems.

Based on preliminary capital cost estimates, the direct investment in the combined facility, without financing costs, is $26.9 Million. This compares to capital costs of $23.5 Million and $5.4 Million for the separate development of the central treatment and storage/transfer components respectively. An overall capital investment reduction of $2.0 Million would be realized with the combined facility. Reduced operating costs related to common services and possible reduction in transportation costs would also be realized. Similarly, the operation of a single site may be viewed as minimizing contingent liability associated with the conduct of these operations.

Other advantages relate primarily to the development being operated under a common system of environmental protection and monitoring. This may be viewed as advantageous from a regulatory and public perspective. The operation of a single site offers more efficient oversight of the operations, provides a more focused emergency response capability and allows environmental monitoring to be more directed.

The disadvantages of the combined facility operation are largely associated with the requirement that it be in or near Winnipeg. Depending on the specific siting options available, the flexibility to expand or modify the facility to meet future needs could be constrained. In addition, it may foreclose the public policy option of using the development as an economic diversification opportunity elsewhere in the province, while committing further concentration of industrial support infrastructure in the Winnipeg region.

5.0 FACILITY SITING

5.1 BACKGROUND

Historically, the largest single barrier to successfully developing a hazardous waste management system has been the difficulty associated with siting the necessary facilities. While general agreement exists respecting the desirability of providing for the management of these materials in an environmentally competent fashion, the public's reluctance to accept the location of facilities has often prevented the provision of the necessary infrastructure to do so. In the case of Manitoba, the need for public acceptance as a fundamental criteria in the development of the system was clearly recognized in the results of the overall program's first phase as summarized in the Clean Environment Commission's statement on the subject in their 1987 Hearing Report (Appendix 1):

> "Public acceptance of the management system components and the location of facilities is essential. Experience elsewhere has demonstrated that, without such public approval, the actual siting of facilities is difficult or impossible. Therefore, public participation in the entire process has been and will continue to be a key feature of all steps in the development of the Hazardous Waste Management Program" (Clean Environment Commission, May 1987).

Consistent with this direction, the Corporation has adopted two overall objectives as prerequisites in selecting sites for the facilities covered in this proposal. These are:

- They must provide a high level of natural environmental protection, consistent with the nature of the industrial activity being undertaken; and,

- General public acceptance must be obtained for them, both provincially and locally.

In the following, the process being used to achieve these objectives is summarized and the results of the Corporation's siting activities to date are provided. A summary of the public information and consultation activities undertaken with respect to the hazardous waste issue generally, and the facility siting work in particular, is included. In the concluding portion of this section, a discussion of the issues and concerns raised to date through this process is offered.

In the overall context of the environmental assessment process and the proposed scope for it covered in the next section of this document, the importance of the public's direct involvement cannot be overemphasized. For this reason the material related to issues and concerns provides important background to the consideration of this proposal.

5.2 FACILITY SITING PROCESS

In the past, the siting of hazardous waste facilities has been undertaken in essentially the same fashion as any other industrial development. This traditional approach is commonly characterized as one of "Design, Propose and Defend". The proponent develops a general technical proposal and picks a location without a significant level of public consultation or understanding of what is involved. Public involvement generally occurs late in the process, often at the time when regulatory approvals are sought. Given the negative perceptual image of hazardous waste facilities, it is not surprising that public reaction is at best defensive and often opposed, even though the facilities may be technically and environmentally sound. The resulting lack of public acceptance at a local level can result in time consuming, expensive consideration and often failure of the proposal. Similarly, the opportunity to develop effective mitigation of the development's impacts and optimization of its benefits is missed.

The facility site selection process used by the Corporation is attempting to apply a different approach that acknowledges the public's right, particularly that of a potentially affected community, to participate in the development process from an early stage. The concept is called "co-management" and involves direct and voluntary participation of those affected in development decisions. The objective of the co-management process is to enable meaningful input into the development by external stakeholders, provide an element of control over it by the affected public if it proceeds and, ultimately, gain a consensus on the development as a viable contributor to solving a collective environmental problem.

The siting process being applied is described in a discussion document entitled "Proposed Site Selection Process for the Development of a Hazardous Waste Management Facility" (Appendix 3). In addition to providing background information on siting experience elsewhere, a three phase process is described. The major elements of each phase are illustrated in Figure 5.1 and are summarized below.

Phase 1 Site Selection Process and Criteria Development

The first phase of the process covers the development of the process itself and the technical and environmental criteria to be applied in identifying where a voluntary approach could appropriately be pursued. In addition, it was directed at developing a consensus on both these aspects through solicitation of public input as well as that of interested government agencies. The major output of this phase is the documentation of overall and detailed criteria for siting and the results of applying these criteria at a provincial level to define regions of greatest interest. This work, along with background material on siting criteria applied elsewhere, has been detailed in a second discussion document entitled "Proposed Site Selection Criteria for the Development of a Hazardous Waste Management System" (Appendix 3).

Phase 2 Candidate Host Community Selection

This phase is primarily oriented to the identification of candidate host communities in areas that exhibit potential through the technical/environmental screening conducted in Phase 1. This identification process involves dissemination of siting information at the municipal government level and open discussion with municipal councils who express interest by approaching the Corporation. This is followed by community sponsored open houses to ensure early public awareness of the issue and to obtain public reaction to it. Additional data collection at a regional level may also be undertaken at this point to obtain a more accurate indication of potential in relation to the siting criteria.

The conclusion of this phase in a particular community occurs with the decision of a community to proceed with a detailed investigation of the development jointly with the Corporation or, alternatively, a decision by either party not to proceed further. The decision to proceed is usually through a formal invitation, passed by resolution of the local municipal councils, and the decision by these councils to form a community advisory group to work with the Corporation. Concurrent with the community's decision to proceed, the Corporation must also be satisfied that sufficient potential exists for locating an environmentally acceptable site and that reasonably good prospects exist for sustaining public support, prior to investing further resources in the evaluation work required.

Phase 3 Site Evaluation and Selection

This phase starts with the formation of a Community Advisory Committee (CAC). While appointed by the councils, the desire that this group represent as broad a range of community interests, expertise and views as possible is expressed by the Corporation. From this point forward, the process proceeds largely as dictated by the Community Advisory Committee and the direction provided to it by the community as a whole. It involves the solicitation of public concerns, provision of information, independent investigation of issues by the community and the review of siting and design related decisions as they arise. In particular, questions such as the finalization and application of detailed siting criteria, land acquisition procedures and selection of candidate sites all require the review and approval of the committee. As the process moves through evaluation of a preferred site or sites, finalization of facility design and environmental assessment work, all results are made public.

At the end of the investigation work, the Community Advisory Committee is expected to make recommendations to the councils on the development and, if favorable, under what conditions. At this point, some demonstration of general approval or otherwise in the community as a whole is anticipated. In parallel, the Corporation will assess the technical, environmental, social and economic aspects with a view to undertaking a more detailed site specific environmental assessment in preparation for making a formal regulatory application.

FIGURE 5.1
PROPOSED SITE SELECTION PROCESS

PHASE 1
Site Selection Process and Criteria Development

KEY STEPS

- o Background Information Collection and Government Agency Input
- o Prepare Site Selection Process Document
- o Prepare Proposed Site Selection Criteria
- o Provincial Screening to Identify Candidate Regions
- o Selection of Candidate Regions
- o Public and Stakeholder Review of Process

PHASE 2
Selection of Candidate Host Communities

KEY STEPS

- o Data Collection on Candidate Regions
- o Technical Screening of Regions
- o Community Consultation in Candidate Regions
- o Define and Evaluate Potential Candidate Host Communities
- o Select Candidate Host Communities

PHASE 3
Site Selection and Evaluation

KEY STEPS

- o Establish Community Advisory Committee(s)
- o Finalize Siting Criteria and Identify Mitigation Issues with Committees
- o Identify Candidate Sites
- o Detailed Evaluation of Candidate Sites
- o Confirmation of Community Support
- o Site Ranking and Identification of Preferred Development Alternatives
- o Preparation of Regulatory Proposal

5.3 FACILITY SITING STATUS

The siting process was formally initiated in the latter part of 1988 with the publication of the siting process and criteria discussion documents (Appendix 3). It has progressed through the first two phases and well into the final phase with several communities. In the following, the results to date are described.

As noted previously, the results of the first phase of the siting process have been documented in the appended report on siting criteria. This work focused on the development of basic environmental criteria applicable to general types of facilities; a fully integrated treatment and disposal facility and a small regional transfer station. It should be noted that the selection of these generic facilities as a basis for the criteria was made prior to finalizing the actual system facilities requirements described in this proposal. The criteria developed for the fully integrated facility are generally applicable to both major facilities covered here. In particular, relatively rigorous environmental constraints should be applied to siting of a major storage/transfer facility. It is the Corporation's view that this type of facility requires a similar or greater level of environmental and public safety consideration to that applied to a treatment facility due to its focus on the handling of volatile, inflammable organic materials.

The criteria have been developed at two levels. The first is the provincial screening criteria summarized in Table 5.1 that can be applied as a basis for identifying general areas of the province having a low probability of meeting the more detailed criteria. The results of applying this exclusionary criteria at a provincial level are illustrated in Figure 5.2.

The second level involves detailed regional criteria that can be applied to areas of interest. These have been subdivided into three general categories; technical, physical/environmental and land use. The specific criteria under each of these categories are listed in Tables 5.2, 5.3 and 5.4. Unlike the provincial screening criteria, which are exclusionary in nature, the regional criteria address both positive and negative attributes and class them with respect to desirability.

The final step in this work was the definition of areas of greatest interest. The major desirable attribute identified relates to the presence of aquitard type soils having low hydraulic conductivity and therefore high natural potential to protect ground water. Publicly available data on surficial geology for the southern part of the province was mapped and overlayed with the exclusionary provincial screening map (Figure 5.2). The results as illustrated in Figure 5.3 show the areas that generally exhibit thick clay or glacial till in Southern Manitoba and that are not excluded by the exclusionary criteria applied at a provincial level. This has been used to define the areas of greatest interest from a technical and environmental perspective.

The first phase results were widely disseminated to municipalities in areas of potential interest, to stakeholder groups and interested government agencies. Since the beginning of 1989, 53 Rural Municipalities, L.G.D.'s, Cities, Towns or Villages, either singly or in groups, have approached the Corporation for more information. Subsequently, 32 community sponsored open houses or public meetings have been held by 32 municipalities to gauge response to further investigating the development. In 9 of these communities, involving 14 municipalities, preliminary mapping work was undertaken at the request of the municipalities to further evaluate potential. It should be noted that expressions of interest continue to be received. The Corporation is responding to these by proceeding with council presentations, open houses where they are requested and in some cases preliminary mapping. However, active investigation beyond this point in the process for communities recently initiating the process is limited by resources and commitments to communities that have progressed to the detailed site selection phases. An overall summary of communities expressing interest is provided in Table 5.5.

Table 5.6 contains a summary of the questionnaire responses received from the initial council sponsored open houses and public meetings held in communities undertaking this step in the process. Figure 5.4 provides an example of the questionnaire used. In total, 78% of the respondents acknowledged that they were contributors to the problem and 77% felt that these materials could be managed in a safe manner. With respect to their community being involved in the investigation of locating a hazardous waste management facility locally, 66% indicated a positive interest, 23% indicated opposition to such an initiative on the part of their community and 9% were neutral.

In assessing these results in any particular community, two major factors have been used by the sponsoring municipal councils and the Corporation in deciding to proceed beyond this point. The first was the degree of interest expressed in further investigation, and the second was the number of people attending the event. Early experience showed that a positive response but relatively low turnout should be viewed negatively or at least as requiring further consultation to gauge interest. In all communities that have proceeded to form Community Advisory Committees and progressed to detailed site evaluation, both a significant turnout and a large majority of positive responses were obtained. In Hamiota and Pinawa for example, positive responses of 89% and 91% were obtained at this initial stage.

To date, the results of the candidate host community selection phase have had eight communities (involving thirteen municipalities) choosing to pursue the investigation as evidenced by council decisions and/or the formation of Community Advisory Committees. The remainder have not been involved further because either the councils chose not to, the Corporation and councils felt insufficient positive public interest was expressed in the development or, in several cases, the Corporation judged that the potential was low from an environmental perspective. Of the eight communities that formal invitations have been received from to date, three chose to withdraw shortly after formation of Community Advisory Committees, one proceeded to the stage of site selection and evaluation prior to withdrawing (Rossburn) and three (Hamiota, Pinawa and Winnipeg) are currently undertaking detailed siting work jointly with the Corporation and one (Montcalm) has only recently started.

TABLE 5.1
PROPOSED PROVINCIAL SCREENING CRITERIA

CATEGORY	EXCLUSION CRITERIA
Natural Hazard	100-year flood plains Seismic risk areas Karst terrain
Environmental Protection	Groundwater pollution hazard areas Provincial parks Wetlands Class 1 agricultural lands Ecological reserves and wildlife lands
Technical	Bedrock outcrop areas Permafrost areas
Land Use	Federal lands

TABLE 5.2

PROPOSED REGIONAL SITE SELECTION CRITERIA

Technical Considerations

Component	Criteria	Classification	Justification
Access	Accessible by highway	Essential	Necessary for facility operation
	Accessible by rail	Desirable	Increases flexibility of operation
Services	Regional availability of electric power natural gas, and water	Essential	Required for facility operation
Land Requirement	64 hectares (160 acres)	Essential	Required for facility operation
	Crown land	Desirable	Land use control

TABLE 5.3

PROPOSED REGIONAL SITE SELECTION CRITERIA

Physical and Environmental Criteria

Component	Criteria	Classification	Justification
Geology	Karst terrain	Unacceptable	Facility integrity
	Seismic prone areas	Unacceptable	Facility integrity
Surficial Geology and Topography	Clay or till of sufficient thickness and low permeability to meet groundwater protection criteria	Essential	Protection of groundwater quality
	Unstable terrain	Unacceptable	Facility integrity
	Steeply rolling terrain	Undesirable	Minimize surface water runoff

Table 5.3 (continued)

Component	Criteria	Classification	Justification
Surface Water	100-year flood plains	Unacceptable	Protection of facility integrity/ surface water quality
	Within 500 metres of lakes and continuously flowing streams or rivers	Undesirable	Protection of surface water quality
	Provincially designated high quality watersheds	Undesirable	Protection of surface water quality
	Defined watersheds directly feeding reservoirs used for public water supplies	Unacceptable	Protection of surface water quality
Ground Water	Unconfined aquifers (ground water pollution hazard areas)	Unacceptable	High pollution hazard
	5 m of clay/till base with a bulk hydraulic conductivity of 10^{-7} cm/sec or less	Essential	Protection of groundwater quality
	10 m of clay/till base with a bulk hydraulic conductivity of 10^{-7} cm/sec or less	Desirable	Protection of groundwater quality
	TOT_{100} greater than 100 years	Desirable	Protection of groundwater quality
Wetlands	Wetland areas	Unacceptable	Protection of wetland habitat
Climate and Air Quality	Within 1 kilometre of residential zoned land in cities, towns and villages	Unacceptable	Protection of public health/ minimization of risk
	Minimum population density in predominant downwind directions	Desirable	Protection of public health/ minimization of risk

TABLE 5.4

PROPOSED REGIONAL SITE SELECTION CRITERIA

Land Use Criteria

Component	Criteria	Classification	Justification
Urban Centres	Within 50 kilometres of a town	Desirable	Facility access and servicing
	Within 100 kilometres of a city	Desirable	Facility access and servicing
Public and Private Facilities	Within 200 metres of a private residence	Unacceptable	Minimization of risk
	Within 1000 metres of public facilities	Unacceptable	Minimization of risk
	Minimum population density in vicinity	Desirable	Minimization of risk and future land use control
Parks	Existing or proposed federal, provincial or municipal parks	Unacceptable	Protection and preservation of parkland
Heritage Resources	Designated or proposed heritage resources	Unacceptable	Protection of heritage resources
Land Claims	Registered Indian land claims	Undesirable	Land use conflict
Renewable Resource Land Use			
Agriculture	Class 1 agricultural lands	Unacceptable	Protection of inherent agricultural capability
	Class 2 and 3 agricultural lands	Undesirable	Minimize conflict with agricultural production
	Intensive agricultural land uses	Undesirable	Minimization of risk and land use conflict
Forestry	Within a designated seed orchard	Unacceptable	Protection of key forest production lands
	Class 2 and 3 forestry lands	Undesirable	Protection of high productivity forestry lands

Table 5.4 (continued)

Component	Criteria	Classification	Justification
Fisheries	Provincially designated high quality watersheds	Undesirable	Protection of surface water quality
Wildlife	Designated wildlife management areas or wildlife refuges	Unacceptable	Protection of key wildlife habitat
	Class 1 wildlife lands	Undesirable	Protection of key wildlife habitat
Ecological Reserves	Within an existing or proposed Ecological Reserve	Unacceptable	Protection of ecologically significant areas of the province
Non-renewable Land Uses			
Mining	Active and inactive mining areas	Unacceptable	Land use conflict and facility integrity
Proposed Development Areas	Designated Reservoir Areas and Power Reserves	Unacceptable	Minimize future land use conflict
	Designated development reserves and active proposal areas	Undesirable	Minimize land use conflict

FIGURE 5.2

PROVINCIAL SCREENING RESULTS

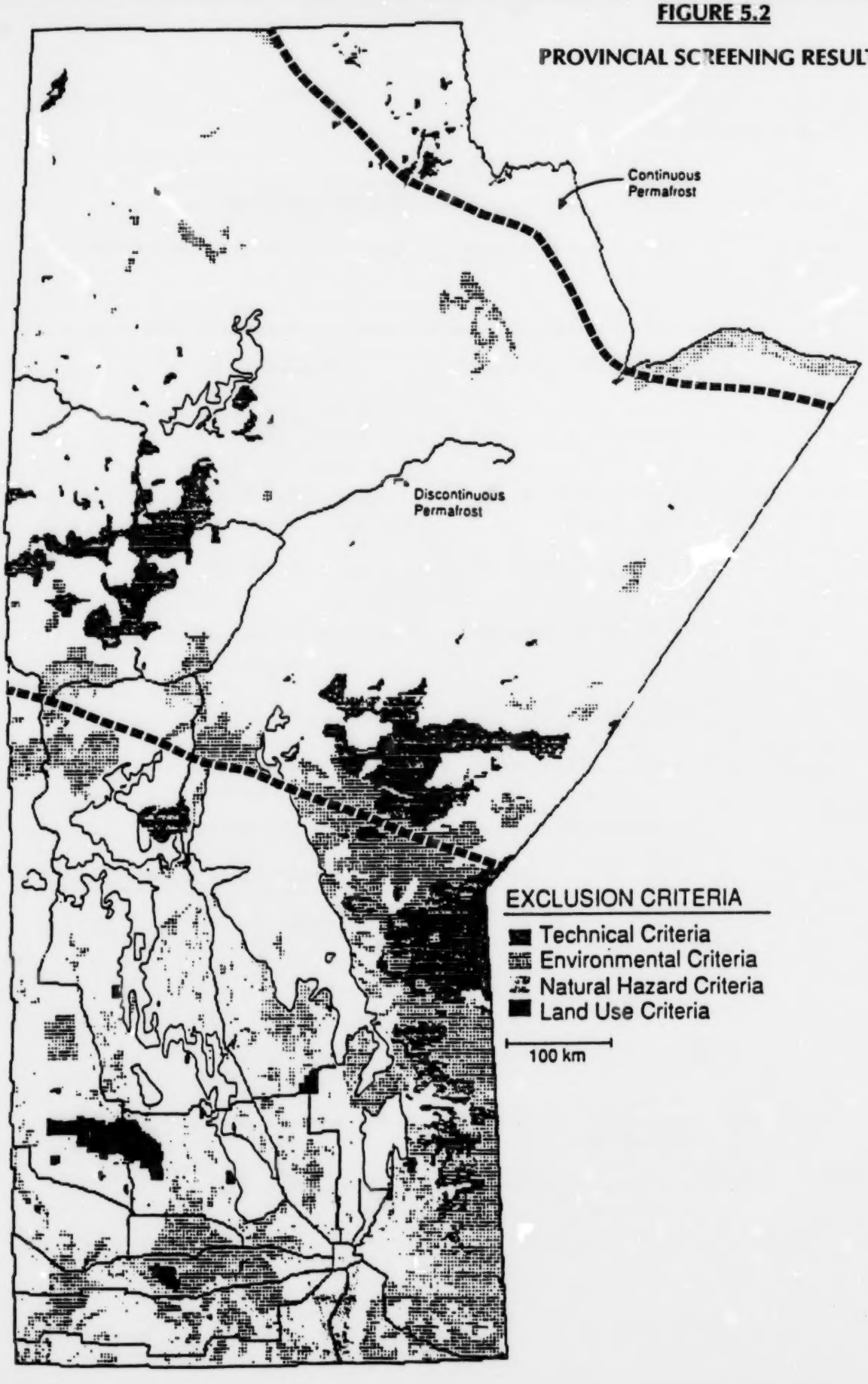


FIGURE 5.3

AREAS OF GREATEST INTEREST

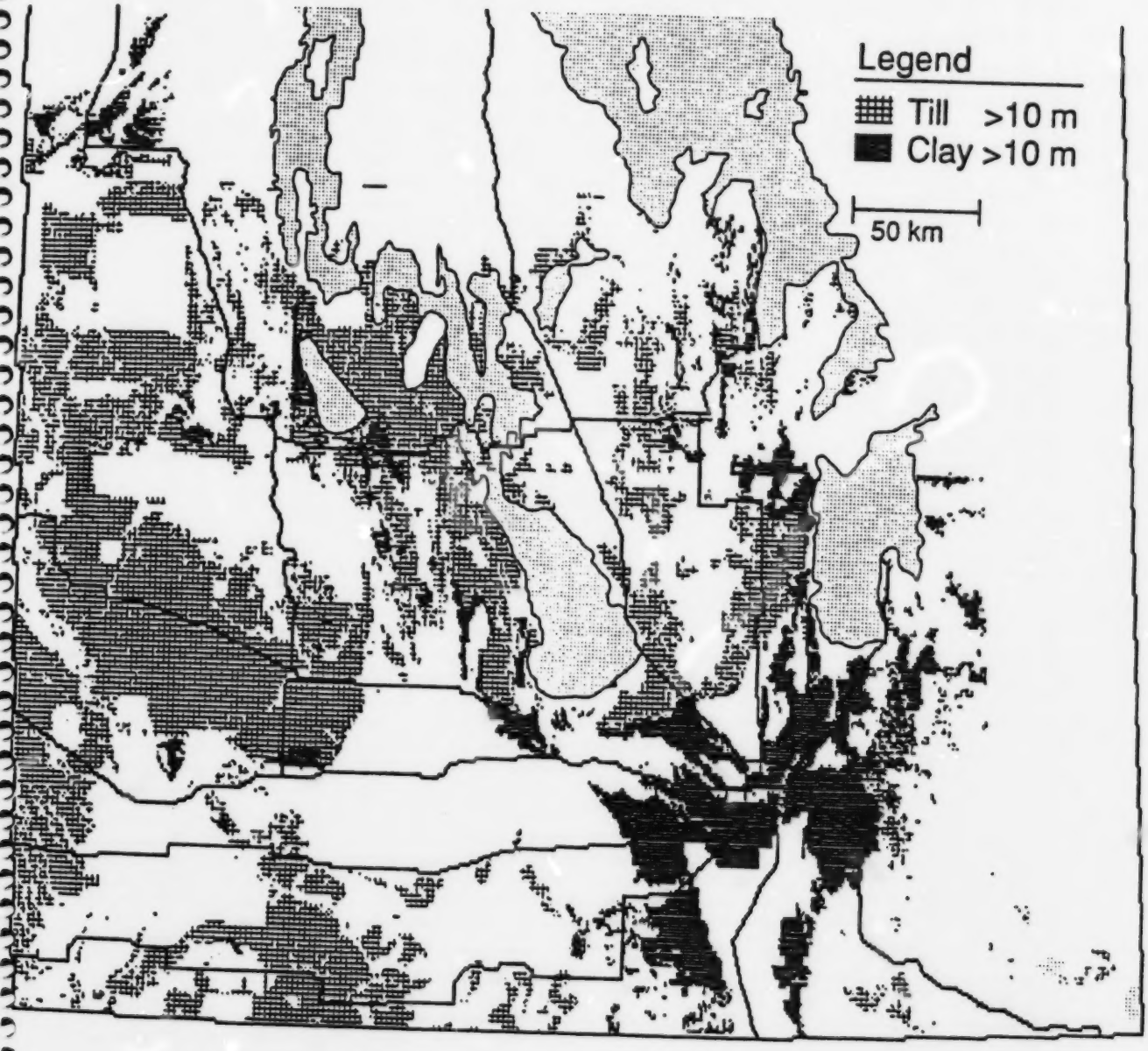


TABLE 5.5
COMMUNITIES EXPRESSING INTEREST

26-Mar-90

COUNCIL PRESENTATION	OPEN HOUSE/ PUBLIC MEETING	ADVISORY COMMITTEE FORMED	PRELIMINARY MAPPING	DETAILED MAPPING
Village of Ste. Rose du Lac	o			
R. M. of Ste. Rose	o		o	
L. G. D. Alonsa	o		o	
R. M. of Ochre River	o		o	
R. M. of McCreary	o		o	
R. M. Lawrence	o		o	
L. G. D. Piney				
R. M. of MacDonald				
R. M. of Cartier	o	o		o
R. M. of Bifrost	o		o	
Village of Riverton	o			
Village of Arborg	o			
R. M. of Elton	o			
R. M. of Dufferin	o			
Town of Carman	o			
R. M. of Tache				
R. M of St. Andrews	o			
R. M. of Brokenhead	o			
Town of Beausejour				
R. M. of Rossburn	o	o		o
Village of Rossburn	o	o		
R. M of Shoal Lake	o			
Village of Shoal Lake	o			
R. M. of La Broquerie				
R. M. of De Salaberry	o	o		o
Village of St. Pierre-Jolys	o	o		
R. M. of Clanwilliam	o			
Village of Erickson	o			
Town of Virden	o			
R. M. of Wallace	o			
R. M. of Pipestone				
R. M. of Coldwell	o		o	
R. M. of Gray				
R. M. of Grandview	o			
Town of Grandview	o			
R. M. of Woodlands	o		o	
L. G. D. Pinawa	o	A		o
R. M. of Hamiota	o	A		o
Village of Hamiota	o	A		
City of Portage la Prairie				
Village Winnipegosis	o			
R. M. of Mossey River	o			
City of Winnipeg			o	
R. M. of Montcalm	o			
R. M. of Ste. Anne				
Village of Ste. Anne				
Town of Boisevain				
R.M. of Morton				
Camperville				
L.G.D. of Grahamdale				
R. M. of Ericksdale				
R. M. of Ethelbert				
Village of Ethelbert				

o	Item Completed
	Indicates Co-Participant
A	Indicates Active Advisory Committee

TABLE 5.6

OPEN HOUSE QUESTIONNAIRE ANALYSIS SUMMARY

COMMUNITY	DATE	VENUE	ATTENDANCE/ QUESTIONNAIRES	QUESTIONS ANSWERED?	DO YOU CONTRIBUTE?	HANDLED SAFELY?	FURTHER INVESTIGATE? YES	NEUTRAL	NO
				%	%	%	%	%	%
1989									
R.M. Bifrost -V. Arborg -V. Riverton	16/01 17/01	oh oh	32/23 47/30	96 97	87 80	83 43	70 60	0 0	13 27
L.G.D. Alonsa	26/01	oh	42/39	87	85	69	56	15	29
R.M. Ste. Rose V. Ste Rose	27/01	oh	140/100	71	73	61	36	10	54
R.M. Elton	31/01	oh	25/18	72	78	67	34	11	55
R.M. McCreary V. McCreary	06/02	oh	73/60	90	80	75	86	3	9
R.M. Dufferin T. Carman - Collegiate - Rec. Centre	09/02 10/02	oh oh	38/35 105/76	80 86	57 84	71 76	69 66	3 7	29 28
R.M. Brokenhead	01/03	oh	44/25	68	76	60	44	4	40
R.M. Rossburn V. Rossburn	08/03	oh	550/314	74	78	74	72	13	14
R.M. Shoal Lake V. Shoal Lake	10/03	oh	34/23	87	87	83	74	4	21
R.M. Cartier	15/03	oh	190/121	88	71	83	73	11	16
R.M. DeSalaberry V. St. Pierre	21/03	oh	76/56	80	73	75	72	13	13
R.M. Rossburn V. Rossburn	06/04	mtg	157/136	78	88	79	62	4	34
R.M. Grandview V. Grandview	19/04	mtg	100/76	63	87	78	58	9	27
R.M. St. Andrews -Lockport -Clandeboye	02/05 03/05	oh oh	21/12 20/14	75 93	67 36	83 79	67 21	8 21	16 57
R.M. Coldwell	10/05	oh	70/49	82	76	78	86	0	14
R.M. Grandview V. Grandview	15/05	oh	127/100	56	66	53	48	6	46
R.M. Clanwillian V. Erickson	16/05	oh	40/40	90	78	68	53	5	40
L.G.D. Pinawa	24/05	oh	97/74	85	90	90	91	8	1
R.M. Hamiota V. Hamiota	06/06	oh	187/146	84	83	85	89	3	4
R.M. Wallace T. Virden	26/06	oh	32/29	83	79	86	65	14	20
R.M. Shoal Lake V. Shoal Lake	27/06	mtg	58/52	75	86	81	55	21	23

TABLE 5.6 (Continued)

COMMUNITY	DATE	VENUE	ATTENDANCE/ QUESTIONNAIRES	QUESTIONS ANSWERED?	DO YOU CONTRIBUTE?	HANDLED SAFELY?	FURTHER INVESTIGATE? YES	NEUTRAL	NO
				%	%	%	%	%	%
R.M. Woodlands	10/08	oh	135/106	73	78	55	56	14	30
R.M. Moncalm									
-St. Jean	14/11	oh	53/43	95	88	91	77	14	10
-Students	14/11	oh	60/60	90	90	92	68	22	10
-Letellier	15/11	oh	30/26	100	85	100	81	15	4
-Students	15/11	oh	12/12	100	83	100	100	0	0
1990									
R.M. Montcalm									
-St. Jean	20/02	oh	165/118	92	88	88	89	2	10
-Letellier	21/02	oh	80/68	87	76	81	75	19	6
TOTAL			2840/2081	2577	2433	2387	2053	279	700
AVERAGE				83%	78%	77%	66%	9%	23%

Notes:

Attendance is number of people signed in.
Numbers may not add up to 100% due to rounding and incomplete questionnaires.

FIGURE 5.4

We appreciate the time you have taken to come to this open house. If you would take a moment to answer these questions, it will help us to better respond to your concerns.

In what municipality do you live? _____

What is your main interest regarding hazardous waste management?

- household hazardous waste _____
- industrial/commercial waste issues _____
- business opportunities _____
- municipal waste issues _____
- economic development issues _____
- waste treatment facility location _____
- other (please state) _____

Were your questions answered?

Yes _____ No _____

Comments _____

Do you think you contribute to the hazardous waste problem?

Yes _____ No _____

Comments _____

Do you believe these wastes can be handled in a safe manner?

Yes _____ No _____

Comments _____

The MHWMC will not consider investigating proposed sites unless there is an invitation from the Community and the Community itself is involved in the site selection process. The selection process is voluntary. The Community can opt out at any time.

Do you think your community should proceed any further in investigating the opportunities and risks of locating a hazardous waste management facility in this area?

Agree Strongly	Agree	Neutral	Disagree	Disagree Strongly

Please circle one response

Comments _____

Do you have any further comments?

_____

_____

Thank You

In both Hamiota (R.M. and Village) and Pinawa, the Corporation is currently completing preliminary site evaluation work in order that site options for detailed site assessment can be finalized and a decision by the community on them can be made. Detailed mapping using criteria approved by the Community Advisory Committees has been completed and, in the case of Hamiota, the results widely distributed. An example of this mapping, for Hamiota, is provided in Figure 5.5. The third current candidate community is Winnipeg where constraint mapping and identification of siting options has been jointly initiated with the City.

5.4 PUBLIC INFORMATION

A fundamental component of the Corporation's overall system development approach and, more particularly, the siting work described above relates to conveying information to the public and soliciting response. In this section, a brief summary of the public information activities undertaken by the Corporation is provided. Section 5.5 contains a summary of the issues related to siting as identified through this process.

Consistent with the direction of the Clean Environment Commission in its final Phase 1 report, the Corporation has placed a high priority on the conveyance of information on the issue and its work to the public. This activity has been conducted at two levels. The first is on a province-wide basis directed at the general public and the wide range of specific stakeholders in the issue. The second is at the community level where the focus has been directed to the provision of information related to facility siting and responding to issues raised by the community in the course of this work. At both levels, the emphasis on public information has three basic objectives:

- Development of public awareness about the overall hazardous waste issue as a collective one in which we all have a stake, both as contributors to the problem and as participants in the solution;

- Defining the issues and concerns related to the solutions being developed in terms of priorities and questions that need to be addressed; and,

- Developing a consensus on the solutions being proposed and on how they are to be implemented, such that a basis for public acceptance of them can be obtained.

The general public information work undertaken at a provincial level has involved a range of vehicles and activities.

a) Published Information

As a policy, the Corporation has made all non-proprietary documentation that it develops publicly available as it is produced. The material contained in the Appendices to this proposal represents examples of this. In addition, a range of other material has been widely disseminated both to the general public and specific interest and stakeholder groups. This material includes:

- Documentation and studies specific to the Corporation's plans and activities;
- Issue specific material related to topics such as household hazardous waste, PCB's, pesticide containers, and environmental education;
- Periodic newsletters;
- An informational video on the issue; and,
- Fact sheets and brochures covering such things as facility descriptions, siting work and services provided by the Corporation.

A listing of such material is provided in Table 5.7

b) Resource Centre

The Corporation operates a publicly accessible resource centre in its Winnipeg offices. This contains a library of technical material related to hazardous waste management in written and video form, as well as an access point for all public information disseminated by the Corporation. It also provides listings of material contained in the Environmental Resource Centre operated by the Department of Environment. This has been used by the general public, students, educators and researchers.

FIGURE 5.5

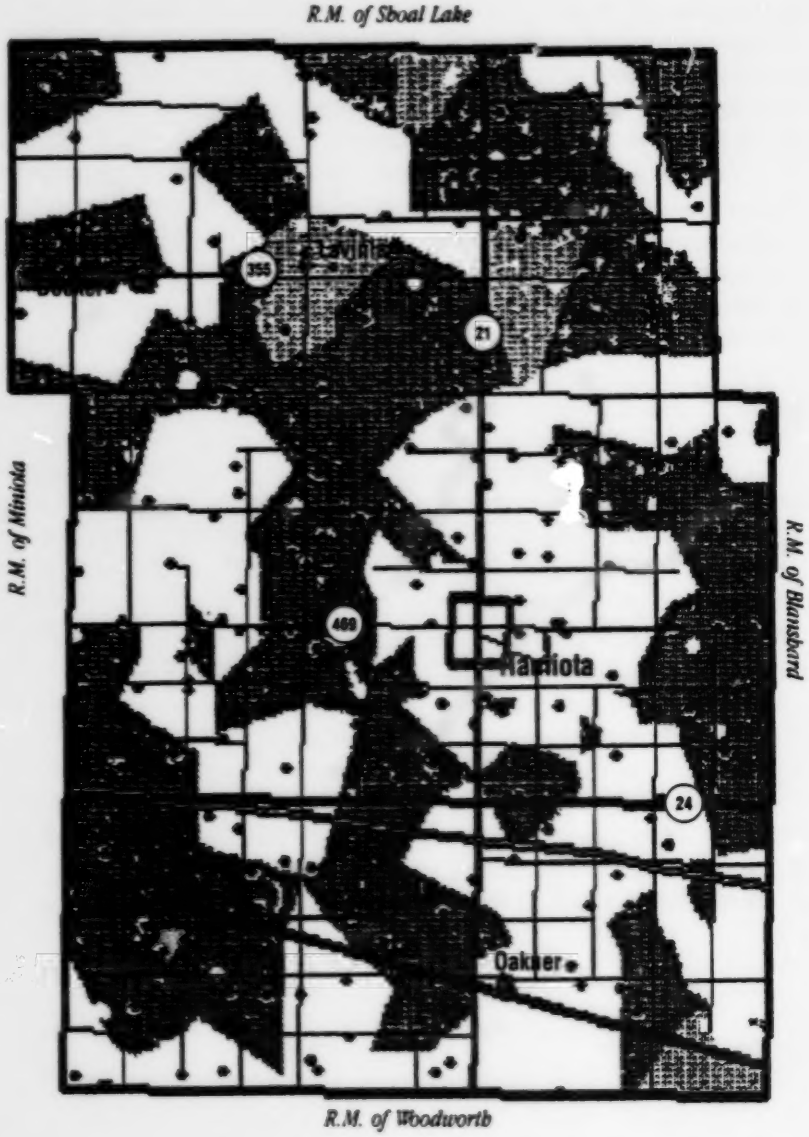
HAMIOTA SITE SCREENING MAP

MANITOBA HAZARDOUS WASTE MANAGEMENT CORPORATION

Rural Municipality of Hamiota

Areas of Greatest Interest

This map shows areas that are most likely to contain su..able sites (40 acre development on a 160 acre site) for a waste management facility.



1 2 3 4 5
0 5 mi.
1 2 3 4 5
0 5 km

LEGEND

Areas of Greatest Interest

- till/clay depth greater than 10 metres
- less than one metre below the surface
- one to two metres below the surface
- unsuitable areas
- 160 acres
- gas pipeline
- railway line
- road
- house
- public facility
- communities

c) Open Houses/Public Meetings

In addition to the open houses and public meetings held as a part of the siting process, the Corporation has directly sponsored or participated in such events at a general level. In late 1988, a series of thirteen open houses in twelve communities around the province were held to introduce the siting process and the issue generally. The venues for these generally followed the locations where Clean Environment Commission hearings had been held. Details on these open houses are documented in Appendix 3. In August of 1989, a series of three open houses was sponsored by local councils in The Pas, Flin Flon and Thompson in recognition of northern interest in the issue. In November 1989, the Corporation participated in a series of public forums organized by the Manitoba Eco-Network on the siting of hazardous waste facilities. These involved a number of participants from the environmental community, communities involved in the siting process, as well as the Corporation, and were held in Brandon and Winnipeg. The results have been documented by the Eco-Network and provide independent critical comment on the public participation aspects of the siting process. This report is contained in Appendix 3.

d) Speakers Program

The Corporation actively seeks the opportunity to speak to groups potentially interested in the issue throughout the province, as well as responding to all requests for such presentations. Over 100 speaking engagements of this nature have been undertaken by Corporation staff and have involved industry associations, professional groups, public interest groups, school and university classes, service organizations and technical conferences. Table 5.8 provides a general list of the organizations and groups that have received presentations.

e) Media Contact

The Corporation maintains an open policy respecting media inquiries related to its activities and the issue generally. Corporation staff have been involved in numerous interviews, call-in programs and media panels as well as contributed articles to various publications.

f) Household Hazardous Waste Services

While in part a service function of the Corporation, the promotion of household hazardous waste collections is viewed as a valuable contributor to public awareness. The Corporation has provided technical and staff volunteer support for the household hazardous waste collections held in Winnipeg in 1988 (Appendix 3) and in 1989. In late 1989, a year round collection depot was opened in Winnipeg that allows the drop off of these materials one day per week. In addition, the Corporation supports community sponsored collection events in smaller communities through the provision of organizational assistance and technical services for the collections themselves. In 1989, 8 such community-sponsored collections were held and a significant interest has been expressed for additional events in 1990.

At a local level, the Corporation's public information activities involve a number of specific measures and practices that parallel those described above but are based on supporting the community's investigation of the development. In two rural communities that progressed to the stage of detailed site evaluation, a local information office was established and staffed with a locally recruited resource person. While supported financially by the Corporation, this is intended to serve as a community resource, with the staff working under the direction of the CAC rather than the Corporation. While the Corporation provides resource material and information through this vehicle, it is expected that information should be independently sought in response to issues and concerns raised in the community.

Consistent with this approach, the Corporation is also committed to providing financial support for independent oversight and review of its work which the CAC may see as necessary in its independent investigation. This could involve technical advice on facility development plans or more general assistance in developing conditions to be attached to the development. Similarly, the Corporation has supported visits by community representatives to other facilities where this has been requested and organized by the CAC.

Other local public information activities include periodic public meetings, participation in public CAC meetings, personal response to individuals raising concerns and provision of information to neighboring communities through council presentations and public meetings.

TABLE 5.7

LISTING OF PUBLIC INFORMATION MATERIALS MADE AVAILABLE BY THE CORPORATION

Corporation Publications

a) Brochures and Pamphlets

Manitoba Hazardous Waste Management Corporation.

La Corporation Manitobaine de gestion des dechets dangereux.

Hazardous Waste Generator Services Program.

What are Household Hazardous Wastes?

Que sont les ... dechets domestiques dangereux?

Generator Services Index.

Facility Site Selection Criteria.

Facility Site Selection Process.

Proposed Central Treatment Facility.

Rural Municipality of Rossburn: Areas of Greatest Interest.

Rural Municipality of Hamiota: Areas of Greatest Interest.

b) Fact Sheets

Central Treatment Facility - Design Basis.

Hazardous Waste Management Facility: Waste Types to be Treated.

Typical Waste Treatment Process.

Physical/Chemical Treatment Process.

Immobilization: The Stabilization/Solidification Process.

Landfill Discussion.

Health Concerns and Hazardous Wastes.

Responses to General Questions Posed by Communities at Public Open Houses.

Studies to Assist in the Selection of a Suitable Site for a Hazardous Waste Management Facility.

Economic Benefits - Central Treatment Facility.

Hazardous Waste Collection Depot.

c) General Information

Waste Management Resources (bookmark of the MHWMC Resource Centre).

The Waste Paper. (newsletter) Fall, 1988.

The Waste Paper. (newsletter) March, 1989.

The Waste Paper. (newsletter) Summer, 1989.

Hazardous Waste Environmental Education Resource Book for Manitoba Teachers. Suggested Activities K-12.

Trousse Pedagogique d'education sur les dechets dangereux dans l'environnement destinee aux enseignants du Manitoba: activites recommandees pour les enfants de la maternelle a la 12e annee.

Manitoba Hazardous Waste Management Corporation: 1987 Annual Report.

Manitoba Hazardous Waste Management Corporation: 1988 Annual Report.

Manitoba Hazardous Waste Management Corporation: Corporate Profile.

TABLE 5.7 CONTINUED

d) Technical Reports

The Development of a Hazardous Waste Management System in Manitoba.

Discussion Document: Proposed Site Selection Process for the Development of a Hazardous Waste Management System.

Discussion Document: Proposed Site Selection Criteria for the Development of a Hazardous Waste Management System.

Report of the Third Household Hazardous Waste Days, Winnipeg, MB, 1988.

Report on the Site Selection Process and Public Response Through the November, 1988, Open Houses.

Options for the Management of Chloroflurocarbons (CFC's) and Halons in Manitoba.

Pilot Pesticide Container and Residue Management Project.

Hazardous Waste Market Characterization Study for Manitoba.

System Scope and Technology Study Part I - Strategy Review (Reid Crowther).

System Scope and Technology Study Part II - Technology Review (Reid Crowther).

System Scope and Technology Study Part III - Conceptual System Design (Reid Crowther).

Transportation Risk Assessment: Part 1 - Data Collection and Model Development (M.M. Dillon).

Health Concerns and Hazardous Waste - (Yassi, Weeks and Kraut).

Publications of Other Organizations

Manitoba Department of Environment, Workplace Safety and Health. Managing Hazardous Wastes.

Manitoba Department of Environment, Workplace Safety and Health. Bibliography: Hazardous Wastes, 1983.

Manitoba Department of Environment, Workplace Safety and Health. Guide to Manitoba's Hazardous Waste Legislation, 1988.

Manitoba Department of Environment, Workplace Safety and Health. Hazardous Waste Management in Manitoba, 1985.

Clean Environment Commission, Report on Public Hearings: November 10, 1986 to January 20, 1987, 1987.

IDS/Monenco for the Manitoba Department of Environment, Workplace Safety and Health. Hazardous Waste Management System Cost Analysis, 1986.

Environment Canada Conservation & Protection. Fact Sheet: Leaking Underground Storage Tanks.

Environment Canada Conservation & Protection. Fact Sheet: Hazardous Wastes in the Western & Northern Region.

Environment Canada. Transport of Hazardous Wastes Question and Answer Manual, 1989.

Environment Canada. Manual for the Management of Wastes Containing Polychlorinated Biphenyls (PCB's), 1987.

Environment Canada. Identification of Fluorescent Lamp Ballasts Containing PCB's, 1986.

Environment Canada. The Evaluation of Mobile and Stationary Facilities for the Destruction of PCB's, 1989.

Ontario Waste Management Corporation. Industrial Waste Audit and Reduction Manual, 1989.

TABLE 5.8

ORGANIZATIONS AND GROUPS RECEIVING PRESENTATIONS

Accident Prevention Association of Manitoba.

AECL/WNRE Employees Technical Seminar.

Alberta Special Waste Services Association.

Air Pollution Control Association.

Air and Waste Management Association.

Association of Official Analytical Chemists.

Association of Professional Engineers of Manitoba.

Banff School of Management.

Brandon Kiwanis Club.

Brandon University (Journalism).

Broiler Hatching Egg Commission.

Canadian Environmental Advisory Council.

Canadian Forces Base Winnipeg (Aviation Fluids Seminar).

Canadian Manufacturer's Association.

Canadian Society of Civil Engineers.

Canadian Standards Association (Consumer/Community Advisory Panel).

Canadian Waste Management Conference.

Carman Collegiate.

Clean Environment Commission.

Chemical Institute of Canada.

Corporate Health Works Symposium.

Environment and the Economy Partners in the Future Conference.

Grandview Economic Development Committee.

Hamiota School.

Interlake Development Corporation.

International Coalition.

Joseph Terres Elementary School.

Manitoba Association of School Trustees.

Manitoba Association of Urban Municipalities.

Manitoba Chamber of Commerce.

Manitoba Dry Cleaning Association.

Manitoba Eco - Network.

Manitoba Eco - Network Hazardous Waste Forum (Brandon).

Manitoba Eco - Network Hazardous Waste Forum (Winnipeg).

Manitoba Environmental Council.

Manitoba Environmentalists Inc.

Manitoba Federation of Labour Occupational Health Group.

Manitoba Milk Producers Marketing Board.

Manitoba Pharmaceutical Association.

Manitoba Recycling Council.

Manitoba Society of Certified Engineering Technicians.

Minnesota Waste Management Board.

Morden Health Committee.

TABLE 5.8 CONTINUED

Mount Carmel Clinic.

Oak Bluff Elementary School.

Oak Park High School.

Parkland Economic Development Corporation.

Portage la Prairie Rotary Club.

Prairie Forum on Rural Development.

Red River Community College (Occupational Health).

Riding Mountain Biosphere Group.

Riding Mountain Regional Liaison Committee.

Rossburn Lions Manor Seniors.

Rossburn High School.

Science Teachers' Association of Manitoba.

Shoal Lake High School.

Sierra Club.

Siting Task Force: Low-level Radioactive Waste Management.

Southeast Regional Planning Committee.

St. Augustine Family Resources Women's Group.

St. Paul's Collegiate, Elie.

Ste. Rose du Lac Elementary School.

Stonewall Health and Community Services Committee.

Thompson Industrial Commission.

Triple S Development Corporation.

Union of Manitoba Municipalities.

University of Manitoba (City Planning).

University of Manitoba (Education).

University of Manitoba (Freshwater Institute).

University of Manitoba (Natural Resources Institute).

University of Manitoba (Waste Management Committee).

University of Waterloo (Environmental Studies).

University of Winnipeg (Environmental Studies).

University of Winnipeg (Political Science).

University of Winnipeg (Public Administration).

Warren Elementary School.

Weed Control Supervisors Conference.

Western Water and Wastewater Association.

Winnipeg Chamber of Commerce.

Winnipeg Chamber of Commerce, Sustainable Development Committee.

Winnipeg Masonic Lodge.

5.5 SYSTEM DEVELOPMENT AND SITING ISSUES

The work to date and more particularly the public consultation aspects of it has raised a wide variety of questions and issues respecting the general development of a hazardous waste management system and specifically the siting of the required facilities. In the following, a discussion of these is provided in recognition that they need to be addressed as the specific developments proposed undergo the formal environmental assessment process.

In general terms, the response received to date indicates a high level of maturity among the general public and people at a local level in addressing the issue and its solutions. While the traditional negative reaction to such developments is not uncommon, the majority of people seem willing to recognize that a problem exists, acknowledge that we are all contributors to it and are willing to consider the solutions offered on their factual merit. This is reflected in the overall survey results from open houses at both the provincial and community level. Furthermore, a significant proportion of those involved, particularly elected officials and opinion leaders, show a willingness to actively consider direct participation in the solutions. All of this indicates a significant positive shift in attitude respecting environmental problems, and the increased acknowledgement of collective responsibility for them.

The public acceptance of the problem and involvement in its solutions is accompanied by a strong desire to understand what is being proposed and meaningful public involvement in any developments. More specifically, the public has articulated a wide range of issues and concerns that they want addressed as conditions of ultimate public acceptance.

In general, the issues and concerns respecting the development of facilities can be divided into four general types:

- Environmental and public health issues;
- Social issues;
- Public policy and process issues; and,
- Economic issues.

In terms of priority, the first three types of issues are the most important to the public. While the prospect of economic development benefits may well be the basis for interest in the developments proposed at a community level, satisfaction of concerns respecting the others remain predominant and must be satisfied as a prerequisite to ultimately gaining public acceptance. In the following, specific concerns and issues raised through the system development and siting process to date are discussed.

a) Environmental/Public Health Issues

While some members of the public reject the proposition that hazardous wastes can be managed safely and maintain the illusion that it is someone else's problem to be addressed elsewhere, a consensus exists that this capability is required, and that it can and should be provided. However, people want to fully understand the solutions that are being proposed and their implications in terms of environmental and public health impacts. This reflects a healthy distrust of technology as well as the acknowledgement that no undertaking is risk free.

Specific questions and concerns involve:

- What waste materials are specifically involved and what are the impacts of these? For example, greater fear is expressed respecting organic materials such as pesticides and PCB's;

- What treatment technologies are being proposed and how do they work? The public is concerned about incineration, largely based on its association with air pollution and perceived health effects. Similar concerns are expressed with respect to processing flammable materials, something that was highlighted by the fire at a storage facility in Quebec and a similar event at a solvent recycling facility in Manitoba;

- What by-products are produced and how are they handled? As an example, the performance of residue stabilization and repository technologies is an issue. This reflects growing public concern respecting land disposal as has historically been practiced for wastes generally and hazardous materials in particular. It also reflects the healthy acknowledgement that this is what is left behind from the facility's operation and the need to have perpetual care applied to it.

- What is the level of risk associated with the development, both in absolute terms and relative to risks associated with alternatives and other activities currently undertaken? This reflects both a need to understand what is being considered in terms of incremental risk and a desire to place this incremental risk in a comparative context to the options of not addressing the problem and of taking other, voluntary risks. Common comparisons that are raised in rural communities relate to occupational exposure to farm chemicals, local storage facilities for these and the implications of traditional rural solid waste management practices. In urban areas comparisons are commonly made to industrial production processes and infrastructure such as chemical plants and hydrocarbon storage installations; and,

- What risks are associated with transportation of waste? A major perceptual concern relates to the transportation of materials to and from the facilities involved. This reflects the increasing awareness respecting the presence of dangerous goods on the road and rail systems as well as a desire to know what additional risk and potential impact would result from this type of development.

In summary, the issues and concerns being expressed do not reflect a rejection of solutions to this environmental problem, something that has been a barrier to their provision in the past. Rather, they reflect the need to fully understand them and their implications as a basis for judging the acceptability of the development.

Recognition of this has reinforced the Corporation's approach and led to the emphasis placed on participation of the community in technical decision making related to design of such things as the residue repository and the siting criteria, open provision of technical information as it becomes available, and the heavy emphasis placed on risk assessment proposed for the EIA. The development of baseline information related to public health and transportation risks early in the development process has been in direct response to public demand for information in these areas.

b) Social Issues

Of equal importance and interrelated to the environmental issues discussed above are a number of social issues. At a general level, these involve decisions on the future direction that communities themselves wish to take, the perception that a community has of itself and the conflicts that any debate related to the future creates. These issues are particularly relevant to rural communities, given the acknowledged trends respecting their viability and economic uncertainties associated with the agricultural industry. An independent report prepared by Brandon University is included in Appendix 3 as a general reference to the overall economic trends and prospects of rural communities.

On one hand, many see this type of development as an opportunity for economic diversification, participation in the growing environmental services industry and as a potentially positive contribution to environmental protection. Recognizing the importance society generally must attach to solving environmental problems in the future, they consider a community involved in these developments as being proud of its participation. At the same time, the economic benefits derived from it will serve to maintain population, reverse trends toward aging of the population, provide needed off farm income, maintain services and infrastructure, and generally stabilize and preserve the community.

Opposing this view, others consider the potential of this kind of development and in some cases any industrial development as a threat to traditional values in the community. This may be reflected in acceptance of the current demographic trends as inevitable or even desirable, fear of it adversely affecting personal equity and the ability to capitalize on it, concern about the community's image as a receiver of other's wastes and the compatibility of this type of industrial development with the existing economic base, particularly agriculture.

Polarization of these views within a community, potentially already under stress respecting the future and changes it may bring, creates conflict. This in itself is an issue in the siting process.

c) Public Policy and Process Issues

The third general type of concern identified flows to some degree from the first two and relates to the public's desire for assurance that the solutions proposed are addressing the issue properly, both in philosophical and practical terms. At a general level, it is reflected by a strong demand for meaningful participation in the development decisions and, at the community level, the ability to exercise some degree of control over the development now and in the future.

Specific issues and concerns in this area are discussed below.

- The relationship of the proposed developments to the overall system and those proposed by others is commonly raised. An almost universal view is expressed respecting the priority that should be attached to management of waste at source. Associated with this is a demand for assurances that the provision of off-site facilities does not diminish this priority, now or in the future. Similarly, the potential development of specialized facilities independent of an overall system is questioned as potentially penalizing the development of a comprehensive capability.

- The issue of facility location in relation to the point of waste generation is often raised in the context of reduced transportation risk, economic advantages, moral responsibility of the major generating community and potential for greater accountability with a larger population.

- The future development of the facility is an issue. Fundamental to the incremental approach is the prospect of future expansion both in terms of capacity and addition of other technologies. While recognized as desirable in terms of the planning of the overall system and ensuring its flexibility to respond to future needs, at a local level this is viewed with some concern and has resulted in a desire to exercise control over future changes.

- The market served by the system and the acceptability of receiving wastes from other jurisdictions is an issue. A general public bias exists for restricting the development to a provincial market, something that all current plans are based on. However, it is recognized that the exclusion of others is contradictory when the system is being designed to export organic wastes.

- The present and future ownership and operating arrangements applied to the development in business terms is an issue. A strong public preference to having a significant degree of public sector participation exists, largely related to a belief that this will provide for the greatest information access, accountability, operating integrity and assurance respecting current and long term liabilities.

- Associated with the preference for significant long term public sector involvement is a general distrust of government and its institutions. Specific questions related to the mechanics and effectiveness of regulatory oversight, the potential for sale of the public interest in the development and, in rural areas, a feeling of little political power are all manifestations of this.

- Flowing from many of the above concerns is the basic desire to exercise a high degree of local control over the development. This involves the concept of conditioning acceptance with specific provisions to address many of the above issues, the ability to independently monitor the operation and participation in the management of the proponent organization through such things as Board memberships. A concern also exists respecting the permanence of these conditions and if they can be arbitrarily circumvented in the future.

- The method and scope by which a community makes a decision on supporting the development or not is an issue. Most see merit in the use of a local referendum, something that several have committed to. However, uncertainty exists over the geographical area that this should cover and the involvement of multiple municipal jurisdictions.

d) Economic Issues

While the kinds of issues described above are paramount, the type and magnitude of economic impacts involved in the proposed developments are also raised.

At a provincial level, a general consensus seems to exist that the development of an effective hazardous waste management system will make a positive contribution to the provincial economy. It is recognized as basic infrastructure required to support current and future economic development and in this context is consistent with a sustainable development philosophy. The major cautions in this area relate to assuring that it is based on an equitable user pay system and that its economic viability in terms of cost recovery is maximized within the context of operating a safe system.

At a local level, the issues focus on the economic impacts, both positive and negative, and understanding these in cost/benefit terms. Particularly in rural communities, the development is recognized as offering positive benefits in terms of municipal revenue, employment and general economic activity. Potential or perceived negative impacts on the community's present economic base are raised as concerns in the context of impact on land values and market effects on agricultural production.

6.0 BASIS AND SCOPE OF WORK FOR THE ENVIRONMENTAL IMPACT ASSESSMENT

6.1 BACKGROUND

One purpose of this submission is to obtain guidelines for the Environmental Impact Assessment (EIA), applicable to the major facilities described in this conceptual project proposal and required for a hazardous waste management system. In the following, the background work undertaken, or being undertaken, for this activity is described and a scope for the site and facility specific EIA is proposed for regulatory consideration and response.

It should be noted that study work required in this area, while potentially differing in detail for either a central treatment or storage/transfer facility on a site specific basis, is being undertaken under the assumption that all major system facilities should be subject to a similar level of assessment. Both types of facilities involved represent relatively major development projects having similar real and/or perceived environmental implications. As such, it is the Corporation's view that each require a formal assessment in environmental terms, in order to provide a sound basis for public and regulatory consideration of their merits.

In the following, the detailed site assessment work being undertaken by the Corporation is described. This is followed by a summary of the general or "generic" study work being done in preparation for the site and facility specific risk assessment. The final section discusses the scope of the EIA proposed for application on a site and facility specific basis to support an application for approval of these facilities.

Consistent with the open and consultative approach to project development adopted by the Corporation, the material presented in this section has, and continues to be, subject to extensive public and regulatory consultation. At the community level, the scope and results of study work will be subject to scrutiny and input by candidate communities. Similarly, this material is made available to the public and specific stakeholder groups and they are given the opportunity to comment and identify additional information needs as the environmental assessment proceeds.

Consultation and review of specific elements of this work has, and continues to be undertaken with a wide range of stakeholder agencies within Government, both directly and under the more formal auspices of a Technical Advisory Committee (TAC) formed by the Interdepartmental Planning Board (IPB). The TAC currently has representation from the Departments of Environment, Natural Resources, Agriculture, Rural Development, Urban Affairs, Highways and Transportation, Culture, Heritage and Recreation, and Industry Trade and Technology.

Ongoing direct consultation with the Department of Environment has been maintained on this work in recognition of its role as the lead regulatory agency in the review and approval of the developments being proposed. In this regard, the general guidelines for an Environmental Impact Assessment for Hazardous Waste Management Facilities (Appendix 3) developed by the Department of Environment pursuant to the Dangerous Goods Handling and Transportation Act provide the initial direction for the EIA Scope of Work.

In summary, the material presented in the following should be viewed in the context of a dynamic and flexible process that can accommodate the input and interests of a wide range of stakeholders. Its formal presentation in this form as part of the regulatory process should further serve this end through the official solicitation of public input.

6.2 SITE ASSESSMENT

At the point in time that the Corporation and the community have identified a prospective site(s) based on the agreed to criteria and available information respecting those criteria, a detailed evaluation of the site is undertaken. The initial objective of this work is to determine the potential acceptability of that site for consideration and application of the environmental impact assessment. The information obtained also provides a major source of input data for conducting the EIA should the site assessment indicate potential and the community wishes to proceed.

The following outlines the scope of this site assessment work as currently being applied. It has been subject to review by the communities currently working with the Corporation and the TAC. To date, one such assessment has been completed and similar studies will be conducted for all sites under consideration. The results of the completed assessment are presented for illustrative purposes only, since the community involved has chosen to withdraw from the process and this particular assessment would not be relevant to any site specific application.

It should be noted that the site assessment work described is not an "Environmental Impact Assessment" but should provide sufficient information to evaluate potential site suitability and provide a basis for the relative comparison of potential sites on an environmental basis. In the context of the EIA, the site assessment work being undertaken at this stage is not necessarily viewed as being complete. Additional evaluation work, on any site proposed in a final application, will be undertaken for the EIA where more data are identified as being required.

The following sections briefly outline the scope of work for each of the major site assessment study components.

a) Environmental Overview

The Environmental Overview includes a review of all information incorporated into the site selection work and a description of the environmental setting. This description includes the following as applicable:

- Geology;
- Surficial geology;
- Hydrology;
- Soils;
- Climate;
- Wildlife;
- Fisheries;
- Vegetation;
- Historic resources;
- Land use; and,
- Access and servicing.

This work describes regional environmental and land use characteristics and will assist in identifying and/or confirming regional and site specific environmental and land use issues which should be addressed in the site specific assessments. In some cases, where warranted by specific uncertainties respecting the site's potential, this aspect could include such things as geophysical surveys to determine depths of surficial material prior to undertaking more extensive work.

b) Site Survey

The Site Survey includes preparation of a survey plan of the site and a controlled air photo mosaic of the site and immediately adjacent lands. Pertinent natural, cultural and land use information will be identified on the photo mosaic to assist in this and potential future work on the site.

c) Hydrogeologic Characterization

Through the development and application of the siting criteria, the protection of groundwater resources has been identified as a prime consideration in the qualification of an acceptable site. As a result, candidate sites identified through the application of these criteria will be significantly affected by their potential to meet the proposed surficial geology and ground water criteria. The site assessment work in this area is intended to directly evaluate this potential on a detailed level and includes the following:

- Terrain stability assessment;
- Characterization of surficial geology;
  - type and depth of materials
  - physical and chemical properties
- Hydrogeologic characterization;
  - groundwater depth and flow characteristics
  - groundwater quality
  - hydraulic conductivity and groundwater velocity
  - TOT_{100} calculation.

Surficial geology and hydrogeology will be defined for the entire site and placed into perspective with respect to the regional setting. As defined in the proposed siting criteria, the hydrogeologic regime must be fully defined such that the TOT_{100} can be calculated. As documented in Appendix 3, the United States Environmental Protection Agency has developed the Time of Travel (TOT) concept as a practical method of judging the acceptability of hydrogeological characteristics in offering natural protection from contaminant release via a ground water path. The TOT_{100} criterion refers to the time it takes for a contaminant flowing at the rate of ground water to travel 100 feet along the flow path of least resistance. If the time of travel is less than 100 years, the local hydrogeology is classed as sensitive. Information required to calculate the TOT_{100} in the saturated zone includes:

- Identification of flow path and direction;
- Hydraulic conductivity;
- Hydraulic gradient; and,
- Effective porosity.

d) Climatology

A review of existing meteorological and climatological information will be compiled for the area around each site. Specific requirements include the following:

- Wind speed and direction (wind rose);
- Temperature;
- Precipitation;
  - rainfall
  - snow accumulation
- Humidity;
- Evaporation rates; and,
- Regional air quality.

The review will include seasonal, maximum, minimum, average, and frequency information for each component.

e) Hydrology

A review of existing information and directed studies will be conducted to provide an assessment of the following:

- Flood risk;
- Site drainage patterns; and,
- Flow and water quality data for potential receiving bodies.

This information will be used to identify the optimum facility location on the site and evaluate site water management options.

f) Soils and Agricultural Capability

A soils survey will be conducted for the site and will include the following:

- Soil type and distribution;
- Profile descriptions;
- Agricultural capability; and,
- Physical and chemical characteristics.

Soil series will be mapped and described on the site and their suitability for facility development assessed. A key component of this work will be an assessment of the soils capability for agriculture. Basic information on the physical and chemical characterization of soils will also be collected (eg. texture, pH, conductivity, CEC, exchangeable bases, organic carbon, nitrogen etc.).

To illustrate the methodology and type of information derived from the site assessment work described above, Appendix 3 contains a report on the site assessment conducted in the Rural Municipality of Rossburn. While defining a site with good potential for further environmental assessment work, this is provided for illustrative purposes only and is not presented as describing a site that the Corporation is giving any further consideration.

6.3 GENERAL RISK ASSESSMENT STUDIES

Like most industrial developments, the facilities required for a hazardous waste management system entail some measure of risk. A number of general risk related studies have and are being undertaken with respect to the facility developments being proposed. This work will serve as input to the site and facility specific EIA and the risk assessment component of it. In the following, the scope and initial results of the general work are described.

This work has three basic components as described below.

a) Overview of Public Health Effects

As reflected through the public consultation to date, a major public concern related to the development of hazardous waste facilities is their potential impacts on public health. As a result, the Corporation has commissioned an independent literature review of such effects with the intent of answering initial questions in this area from communities and providing early guidance respecting mitigation and monitoring appropriate to address potential concerns.

The study (Appendix 3) was conducted by the Department of Community Health Services, University of Manitoba and has involved direct consultation and input from several participating communities. The work provides an overview of potential exposure paths requiring consideration in such assessments, methodologies used to determine impacts and a review of the literature related to such effects from a variety of facilities.

The results address the concept of relative risk in the context that proper management of hazardous waste is clearly preferable to not doing so in public health terms. It also suggests that very limited published evidence exists to attribute negative health impacts even to poor facilities. However, the need to demonstrate the integrity of any facilities proposed in such terms is recommended in recognition of the public's concern in this area. As a result, specific recommendations respecting the development of baseline information and ongoing monitoring programs in this area are made.

b) Transportation Risk Assessment

A second area of public concern is that associated with transportation. The movement of hazardous wastes inevitably presents some risk and is often perceived as a major concern. However, in view of the small volumes of this material involved, the incremental risk should be low in relative terms when compared to the overall risks associated with transportation generally and particularly the transportation of regulated dangerous goods of which hazardous waste is a subset.

In order to place this risk issue in perspective as well as provide assessment tools to quantify and plan mitigation of the actual risks involved in any particular development proposal, a base line transportation risk assessment study has been undertaken. Phase 1 of this work has been completed and is contained in Appendix 3. Its scope relates to the collection of traffic information on the provincial highway and rail system and its inclusion in a computer model. The information accumulated includes overall, commercial truck and dangerous goods traffic volumes and accident frequencies. Additional information related to dangerous goods traffic accident frequencies and their consequences have also been sourced for inclusion on any route specific analysis.

Based on this work a number of preliminary or general conclusions can be drawn including:

- Ten to 15% of commercial truck traffic is estimated to be carrying dangerous goods;
- Commercial truck movements in Southern Manitoba on major highways range up to 1,661/day;
- Commercial truck accident frequencies based on the ratio of traffic volume is typically less than 0.5 accidents per million vehicle kilometers;
- Three percent of commercial truck accidents involve spills of dangerous goods;
- Greater than 50% of all dangerous goods transportation accidents occur within Winnipeg; and,
- The incremental addition of commercial truck movements created by the hazardous waste management system is estimated to be approximately nine vehicles per day over half of which will be in Winnipeg.

The incremental commercial truck traffic estimate assumes that six vehicles per day are associated with a transfer station and three vehicles per day are required to transport wastes to a rural treatment facility. The estimate assumes the system operates five days per week. The total commercial vehicle traffic would be reduced to approximately six vehicles per day for a combined facility.

The development of a computer based transportation model which incorporates the entire provincial trunk highway network and rail lines will facilitate a comparative evaluation of transportation risks for various development alternatives. The model will also be useful in optimizing the route and developing mitigative measures on a site specific basis.

These general results suggest that the development of a hazardous waste management system will involve only small overall incremental risks associated with movement of this material. Furthermore, these will continue to be concentrated in the Winnipeg region as is the case with dangerous goods movements, regardless of the location of facilities. However, this work is being done as part of the generic site specific risk assessment studies described below. This will allow comparative transportation risks for various development alternatives to be quantified, routing to be optimized and mitigation measures to be designed into the transportation system proposed, as appropriate.

c) Generic Risk Assessment

A "generic" risk assessment which investigates the potential risk associated with system components is currently being initiated. Based on the design work undertaken to date on the major system facilities, it is intended to provide a preliminary measure of risks associated with the principal operations and technologies being proposed. More specifically, it will assess the following aspects in terms of environmental and public exposure:

- Storage and handling;
- Transfer operations;
- Pre-treatment and bulking operations;
- Physical/chemical treatment;
- Immobilization;
- Residue disposal; and,
- Waste water treatment.

In addition, background information from literature sources on other hazardous waste treatment technologies such as incineration and solvent recycling processes will be documented, even though they are not being specifically proposed as components of the major system facilities. This material is included to respond to general public interest in these specific aspects and to provide an overall indication of risk associated with the management of hazardous waste wherever these activities are undertaken.

This work will estimate the risks based upon potential exposure pathways associated with the various system components and/or operations listed above. The analysis will concentrate on estimating risk associated with normal operating conditions. However, the probability of occurrence and potential risk associated with upset conditions will also be addressed.

6.4 PROPOSED SCOPE OF THE ENVIRONMENTAL IMPACT ASSESSMENT

6.4.1 Overall Scope and Approach

The conclusion of the first stage of the Corporation's system development work will be marked by the submission and review of an application to the Department of Environment for the principal facilities required for the system. As noted earlier, it is planned that this application present preferred alternatives for the development of a central treatment facility and a storage/transfer facility. The documentation supporting this application will include the evaluation of environmental impacts associated with the facilities proposed. In the following, the proposed scope of this work is presented. The public and regulatory review of this material is requested such that guidelines applicable to it can be issued.

The general scope of work described will apply to both the separate and combined development options for the required major facilities, recognizing that the detailed work could vary with the specific facility and location. For this reason, it is requested that guidelines issued in response to this proposal address any specific aspects felt appropriate to the range of facility and siting alternatives potentially involved. This will also facilitate separate submissions for major facilities in the event that their development cannot be pursued in parallel.

The main EIA document will focus on the presentation of results in summary form and will be supported by Appendices containing detailed studies used to generate the information. In some cases, this will involve the inclusion of material appended to this application.

6.4.2 Detailed Scope of Work

Figure 6.1 provides a table of contents for the proposed EIA document. Section 1.0, Executive Summary, will provide an overview of the EIA findings and will be reproduced and widely distributed to the public. Sections 2.0, 3.0 and 4.0 will provide general background, describe the proponent and outline the overall system development plan, similar to what has been done in this project proposal. The following five sections will be specific to the facilities being proposed and will cover the proposed system configuration and site selection, description of the proposed facilities, detailed site characterization of the selected site(s), impact assessment results and mitigative measures proposed. In the following, the general scope of these last five sections is described.

Section 5.0 System Configuration and Site Selection

In this section, the factors associated with selecting the proposed system configuration will be presented. The facility development options will be described initially. This will be followed by a description of the site selection process applicable to each of these options and a comparison of the available siting alternatives. This comparative evaluation will include technical, environmental, social and economic considerations. The concluding section will describe the preferred system configuration and recommended site or sites applicable to it.

Section 6.0 Description of Proposed Facilities

This section defines the specific facilities proposed from a physical and technical perspective. It is intended to provide a detailed description of the proposed facilities and the technical data related to their performance in environmental terms. This is intended as input into the impact assessment process and will include the following:

- An overview of the facility and its operation;
- Characterization of materials handled;
- Facility design basis and standards;
- The layout and supporting rationale for it;
- Transportation and access considerations;
- Technology selection and rationale;
- Details of each operating component inclusive of process details of treatment processes;
- Process flow diagrams defining materials balances;
- Emission control design for all potential continuous, fugitive and intermittent sources; and,
- Operating procedures.

7.0 Site Characterization

In this section, the proposed site(s) and their surroundings will be described in terms of resources, environmental and socio-economic features, and land use.

The technical and physical component of the site characterizations will include the following:

- Land ownership;
- Legal description;
- Zoning;
- Site air photo mosaic;
- Land use description;
- Soil survey;

FIGURE 6.1

PROPOSED TABLE OF CONTENTS

**ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENT
APPLICABLE TO THE
MAJOR FACILITIES OF A
HAZARDOUS WASTE MANAGEMENT SYSTEM**

1.0 EXECUTIVE SUMMARY

2.0 INTRODUCTION

3.0 BACKGROUND

3.1 Provincial Hazardous Waste Management Program
3.2 Manitoba Hazardous Waste Management Corporation

4.0 PROVINCIAL HAZARDOUS WASTE MANAGEMENT SYSTEM

4.1 System Development Strategy
4.2 Waste Market Characterization
4.3 Overall System Plan

5.0 FACILITIES CONFIGURATION AND SITE SELECTION

5.1 Facilities Development Options
5.2 Site Selection Process
5.3 Comparison of Siting Alternatives
5.4 Proposed Facilities Configuration and Siting

6.0 DESCRIPTION OF PROPOSED FACILITIES

(Note: The scope of facility descriptions for both separate and combined facility configuration options are presented, recognizing that the EIA may only contain a single preferred option).

FIGURE 6.1 CONTINUED

6.1 CENTRAL TREATMENT FACILITY

- 6.1.1 Facility Overview
- 6.1.2 Materials Received
- 6.1.3 Design Basis
- 6.1.4 Plot Plan
- 6.1.5 Transportation and Access
- 6.1.6 Technology Selection
- 6.1.7 Description of Operating Components
  - 6.1.7.1 Materials Handling and Storage
  - 6.1.7.2 Inorganic Physical/Chemical Treatment
  - 6.1.7.3 Organic Physical/Chemical Treatment
  - 6.1.7.4 Solid Residue Immobilization
  - 6.1.7.5 Residue Repository
  - 6.1.7.6 Laboratory
  - 6.1.7.7 Site Support Infrastructure
- 6.1.8 Materials Balance
- 6.1.9 Emission Controls
- 6.1.10 Operating Procedures

6.2 STORAGE/TRANSFER FACILITY

- 6.2.1 Facility Overview
- 6.2.2 Materials Received
- 6.2.3 Design Basis
- 6.2.4 Plot Plan
- 6.2.5 Transportation and Access
- 6.2.6 Technology Selection
- 6.2.7 Description of Operating Components
  - 6.2.7.1 Materials Handling and Storage
  - 6.2.7.2 Liquids Bulking and Blending
  - 6.2.7.3 Volume Reduction and Recycling
  - 6.2.7.4 Site Support Infrastructure
- 6.2.8 Emission Controls
- 6.2.9 Operating Procedures

FIGURE 6.1 CONTINUED

6.3 COMBINED CENTRAL TREATMENT AND STORAGE/TRANSFER FACILITY

- 6.3.1 Facility Overview
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- 6.3.4 Plot Plan
- 6.3.5 Transportation and Access
- 6.3.6 Technology Selection
- 6.3.7 Description of Operating Components
  - 6.3.7.1 Materials Handling and Storage
  - 6.3.7.2 Inorganic Physical/Chemical Treatment
  - 6.3.7.3 Organic Physical/Chemical Treatment
  - 6.3.7.4 Solid Residue Immobilization
  - 6.3.7.5 Residue Repository
  - 6.3.7.6 Laboratory
  - 6.3.7.7 Liquids Bulking and Blending
  - 6.3.7.8 Volume Reduction and Recycling
  - 6.3.7.9 Site Support Infrastructure
- 6.3.8 Materials Balance
- 6.3.9 Emission Controls
- 6.3.10 Operating Procedures

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- 7.2. REGIONAL OVERVIEW
- 7.3 BIO-PHYSICAL DESCRIPTION
  - 7.3.1 Climate and Air Quality
  - 7.3.2 Geology and Soils
  - 7.3.3 Surface Water
  - 7.3.4 Ground Water
  - 7.3.5 Vegetation
  - 7.3.6 Wildlife
- 7.4 ZONING AND LAND USE
  - 7.4.1 Agriculture
  - 7.4.2 Residential
  - 7.4.3 Commercial
  - 7.4.4 Industrial

FIGURE 6.1 CONTINUED

7.5 COMMUNITY PROFILE

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- 7.5.2 Demographic Data
- 7.5.3 Economic Base
- 7.5.4 Infrastructure and Services
- 7.5.5 Issue Specific Data

8.0 IMPACT ASSESSMENT

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- 8.1.4 Soils
- 8.1.5 Vegetation
- 8.1.6 Wildlife
- 8.1.7 Mitigative Options
- 8.1.8 Bio-Physical Impact Comparisons

8.2 LAND USE IMPACTS

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- 8.2.2 Recreation
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- 8.2.6 Mitigative Options

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- 8.4.2 Exposure Scenarios
  - 8.4.2.1 Normal Facility Operation
  - 8.4.2.2 Facility Upsets
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- 8.4.3 Event Probabilities
- 8.4.4 Emission Characterization and Modelling
- 8.4.5 Exposure Estimates
- 8.4.6. Risk Assessment Methodology
- 8.4.7 Public Health Risk Assessment Results
  - 8.4.7.1 Acute Exposure Scenarios
    - 8.4.7.1.1 Facility Upsets
    - 8.4.7.1.2 Transportation Incidents
  - 8.4.7.2 Chronic Exposure Scenarios
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FIGURE 6.1 CONTINUED

9.1.4 Occupational Health and Safety Monitoring

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9.2.2 Transportation Emergency Response Plan
9.2.3 Facility Emergency Response Plan
9.2.4 Incident Reporting

9.3 FACILITY DECOMMISSIONING PLAN

9.3.1 Closure Plan
9.3.2 Site Reclamation
9.3.3 End Use Options
9.3.4 Perpetual Care and Monitoring

9.4 LIABILITY

- Site and regional hydrology;
- Site and regional hydrogeology;
- Vegetation and wildlife description;
- Natural resources; and,
- Location of private and public facilities.

The information presented will be based on the results of the site assessment work which was conducted as part of the site selection program described in Section 6.2 of this document. It includes site specific information on hydrogeology, hydrology and soils as well as regional information on natural resources, vegetation wildlife and climatology. Additional data collection will be conducted as required, and as may be requested by regulatory agencies and the host community, to meet the specific information needs of the EIA.

It should be noted that the information provided here not only provides the input to the impact assessment, it will form the initial basis for the bio-physical baseline to be used as a reference for the long term monitoring undertaken during the operation of the facility. It is anticipated that this baseline data will be further developed for the approved site(s) prior to the commencement of operations.

This section would also include appropriate community profile information and basic socio-economic information related to development history, demographic characteristics, economic base and infrastructure, as well as any other data that have been accumulated to address community specific issues.

Section 8.0 Environmental Assessment

The Environmental Impact Assessment will be developed to respond to the specific environmental and socio-economic concerns expressed by the local public, provincial stakeholders and regulatory agencies. This issue oriented impact assessment will address both direct and indirect effects associated with all phases of project development including planning, construction, start-up and operational phases. Consideration will be given to potential effects associated with continuous emissions, intermittent and fugitive emissions and potential accidental releases associated with the operation of the system.

As outlined in Figure 6.1, it is proposed that the actual assessment be done under four major headings as described below.

Section 8.1 Bio-physical Impacts

This section will focus on the potential impacts of the development on air quality, surface water quality, ground water quality, soils and biota (wildlife, aquatic organisms, birds, vegetation). It will assess the potential effects of contaminant emissions on receptors via these pathways. The assessment will include both potential site specific effects, such as loss of habitat and indirect effects such as may be perceived by more remote users of environmental resources.

Section 8.2 Land Use Impacts

This section will discuss potential effects of facility construction and operation on local, regional and provincial land uses. Agricultural, recreational, residential, commercial and industrial land use categories will be investigated. Emphasis will be placed on identifying potential site specific and local effects associated with facility development. These could include direct impacts such as removal of agricultural land from production or indirect effects such as potential impacts of facility operation on existing and future use of adjacent lands.

Section 8.3 Socio-Economic Impacts

This section will encompass the socio-economic impacts of the development. The primary focus will be impacts at the community level, although a general assessment of potential impacts at a provincial level will be provided.

The evaluation of quantifiable socio-economic impacts on a community specific level during both construction and operation will be issue oriented and include the following:

- Direct, indirect and induced employment impacts;
- Direct and indirect expenditure impacts on the local economy;
- Demographic impacts;
- Impact on infrastructure and services;
- Impact on municipal finance;
- Impact on future economic development options; and,
- Other impacts and issues identified in the course of the community's investigations.

In addition, a discussion of less quantifiable potential social impacts will be provided as appropriate. Depending on the particular siting option involved, this could address such issues as impact on current social and cultural values.

As applicable, this section will also outline proposed community specific impact management programs that could address such things as:

- Measures to optimize the local social and economic benefits of the project;
- Mitigation measures to prevent or reduce potential negative effects;
- Compensation measures to redress or offset unavoidable negative effects or the perception of these effects;
- Contingency measures to aid in the detection and timely response to potential problems and unanticipated effects;
- Community relations measures to ensure effective two-way communication and joint problem solving to resolve concerns and issues on a continual basis; and,
- Monitoring and decision-making processes to ensure that the above are, and will continue to be, addressed.

It should be noted that the scope of this section will be heavily influenced by community participation in the investigation of the development. It is anticipated that many of the issues and questions addressed in this section will originate with the community. Similarly, the impact management programs will be a direct response to these issues and more formally to the specific conditions attached by the community as a basis for its support of the development.

Section 8.4 Risk Assessment

In recognition of the public concern related to health and safety issues, a formal risk assessment will be undertaken. This will apply the generic risk assessment work (Section 6.3) on a community and facility specific basis. It will address the probability and consequences of accidental releases (eg. transportation accidents, operational upsets) as well as the potential long term chronic effects of facility operation on human receptors.

The evaluation of risks associated with all treatment technologies likely to be associated with each facility development option proposed will have been addressed at the site assessment stage in the generic risk assessment studies. (Section 6.3). At the EIA stage, this information will be refined based on the detailed facility design information and the site characterization such that a site specific estimate of risk can be quantified. Risks will be described in public health terms and placed into perspective by comparison with existing estimates of public health risk associated with normal daily activities in our society.

It should be noted that this work can also provide the basis for an ongoing risk assessment program, utilizing the data from the environmental monitoring undertaken during the operation of facilities. This is intended to provide a current estimate of risk to the community and regulator, identify the need for additional mitigation if appropriate and generally assist in the demonstration of the facility's integrity. In addition, it could be used to support any future addition to facility capacity or capability.

Section 9.0 Overall Mitigative Measures

The proposed overall mitigative measures will be discussed in this section under the headings described below.

Section 9.1 Monitoring

The ability to demonstrate the integrity of the facilities involved on an ongoing basis is fundamental to the principle of assurance and perpetual care that forms a basic part of a competent hazardous waste management system. This ability requires provision for monitoring of the proposed facilities. In this section of the EIA the design, operation and administration of this monitoring will be presented in detail. This will include the proposed additional baseline data collection activities to be undertaken for the approved site(s) prior to operation.

As outlined in Figure 6.1, this section will define all monitoring undertakings including:

- Process control;
- Emission monitoring;
- Ambient environmental monitoring; and,
- Occupational health and safety monitoring.

The monitoring program will conform with all existing requirements and will incorporate input from regulatory agencies and the community in the design of the program, its conduct and the reporting of results. With respect to the latter, the need for access, timely reporting and potentially independent administration of the monitoring programs will be addressed.

Section 9.2 Emergency Response/Contingency Plan

The proponent's undertakings and plans respecting provision of emergency response capability and contingency planning will be described in this section. This will include the responsibilities, training, planning and operation of a comprehensive emergency response capability. The plan will address both off-site (eg. transportation) and on-site emergencies. A draft, site specific, Emergency Response Plan will be proposed. This plan will undergo regulatory and public review as part of the EIA process and will be finalized and implemented prior to facility operation. Also addressed in this section will be the issue of responsibility respecting contingent liabilities associated with upset events and emergencies.

Section 9.3 Facility Decommissioning Plan

This section will provide the conceptual facility decommissioning plan, inclusive of the goals, objectives and responsibilities for the eventual decommissioning of the facility. A major component of this plan will be defining the assignment of responsibilities with respect to site investigations, remediation, process equipment removal, reclamation, perpetual care and monitoring, and liability. It will also address various end use options for decommissioned sites.

Section 9.4 Liabilities

In recognition that the liabilities associated with the development and operation of the proposed facilities constitute a major public issue, this section will fully describe the assignment of responsibility for them, the mechanisms by which they are provided and the magnitude of their coverage. More specifically, it will cover such things as:

- Assignment of risk between the involved parties, (i.e. waste generators, facility owners/operators, public institutions);
- General insurance coverage proposed by the proponent respecting its operations;
- Specific environmental impairment insurance coverage proposed by the proponent;
- Provision for contingency funds for environmental incident response, and mechanisms for administration and access; and,
- Public undertakings respecting the overall backstopping of liabilities.

APPENDIX 1

PHASE I DOCUMENTATION

Tab 1 Report on Manitoba Symposium on Hazardous and Special Waste, Manitoba Environment and Workplace Safety and Health, March 1983.

Tab 2 Report on Public Hearings, Manitoba Clean Environment Commission, 1984.

Tab 3 Hazardous Waste in Manitoba, Yee, Kucera and Keleher (editors), July 1985.

Tab 4 Report on Public Hearings, Manitoba Clean Environment Commission, 1987.

Tab 5 Guide to Manitoba's Hazardous Waste Legislation, Kucera (editor), 1988.

Tab 6 Manitoba Hazardous Waste Management Corporation Act, 1986.

Tab 7 Manitoba Hazardous Waste Management Corporation - Second Annual Report 1988.

Tab 8 Corporate Profile, Manitoba Hazardous Waste Management Corporation.

APPENDIX 2

SYSTEM PLANNING DOCUMENTATION

Tab 1 The Development of a Hazardous Waste Management System in Manitoba, Manitoba Hazardous Waste Management Corporation, August 1988.

Tab 2 System Scope and Technology Review Part I - Strategy Review, Reid Crowther & Partners Limited, August 1988.

Tab 3 System Scope and Technology Review Part II - Technology Review, Reid Crowther & Partners Limited, October 1988.

Tab 4 System Scope and Technology Review Part III - Conceptual System Design, Reid Crowther & Partners Limited, December 1988.

Tab 5 Hazardous Waste Market Study for Manitoba, Manitoba Hazardous Waste Management Corporation, November 1989.

APPENDIX 3

FACILITIES SITING AND ASSESSMENT DOCUMENTATION

Tab 1 Discussion Document - Proposed Site Selection Process for the Development of a Hazardous Waste Management System, Manitoba Hazardous Waste Management Corporation, July 1988.

Tab 2 Discussion Document - Proposed Site Selection Criteria for the Development of a Hazardous Waste Management System, Manitoba Hazardous Waste Management Corporation, October 1988.

Tab 3 Report on the Site Selection Process and Public Response Through the November 1988 Open Houses, Manitoba Hazardous Waste Management Corporation, March 1989.

Tab 4 Due Process: A Snapshot of Public Participation in the Site Selection Process for the Manitoba Hazardous Waste Management Corporation, Manitoba Eco-Network, February 1990.

Tab 5 Prairie People: Changes and Challenges, WESTARC Group Inc., October 1989.

Tab 6 General Guidelines for the Preparation of an Environmental Impact Assessment for Hazardous Waste Management Facilities Regulated Under the Manitoba Dangerous Goods Handling and Transportation Act, Manitoba Environment, February 1990.

Tab 7 Health Concerns and Hazardous Waste, Manitoba Hazardous Waste Management Corporation, Yassi, Weeks and Kraut, March 1990.

Tab 8 Transportation Risk Assessment Part 1 - Data Collection and Model Development, M.M. Dillon Limited, December 1989.

Tab 9 Report of the Third Household Hazardous Waste Days, Winnipeg, 1988, Manitoba Hazardous Waste Management Corporation, 1989.

Tab 10 Rural Municipality of Rossburn Candidate Site Assessment Volumes 1 & 2, KGS Group Inc., 1990.

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